SCOPING STUDY ON THE DEVELOPMENT AND SUSTAINABLE UTILISATION OF INLAND FISHERIES IN SOUTH AFRICA

Volume 2: Case Studies of Small-Scale Inland Fisheries

BN Tapela, PJ. Britz
and QA Rouhani

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WATER RESEARCH COMMISSION

Scoping Study on the Development and Sustainable Utilisation of Inland Fisheries in South Africa

Volume 2.
Case Studies of Small-Scale Inland Fisheries

Report to the
WATER RESEARCH COMMISSION
By

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EXECUTIVE SUMMARY

Small-scale fishing on inland waters is a widespread livelihood activity which has been overlooked in environmental policy and management arrangements flowing from South Africa's democratic Constitution. This has perpetuated the Apartheid and Colonial era legacies of marginalisation of rural communities from natural resource access and, in the absence of clearly defined use rights, resulted in unmanaged and unsustainable fishing practises, and growing user conflicts. A major constraint to addressing the situation at policy level was identified as the lack of quantitative information on inland fishing for livelihood purposes.

In order to address this information need the Water Research Commission funded a solicited research project entitled; 'Baseline and scoping study on the development and sustainable utilisation of storage dams for inland fisheries and their contribution to rural livelihoods'. The results of the study are reported in two volumes;- the 'Research Report – Volume 1[1]', and the present report, 'Case Studies of Small-Scale Inland Fisheries' – Volume 2.

Research Methodology

The project was executed by a trans-disciplinary team of researchers with fisheries and social science backgrounds from Rhodes University's Department of Ichthyology and Fisheries Science; the University of the Western Cape's Institute for Poverty, Land and Agrarian Studies (PLAAS), and the South African Institute for Aquatic Biodiversity (SAIAB).

The research approach consisted of a combination of literature reviews, community based surveys, fishery productivity modelling, and stakeholder consultations. The available literature on South African inland fisheries was reviewed, access rights arrangements and legislation analysed with recommendations for reform, and the production potential of South African impoundments estimated using morpho-edaphic models. A research survey was carried out on selected fishing communities to evaluate the role of indigenous and local knowledge in inland fishery utilisation, and to characterise the role of inland fisheries in rural livelihoods.

A series of consultations and workshops was conducted with rural fishing communities, mandated government department representatives, and recreational angling bodies. The institutional and organisational requirements for inland fisheries governance were then analysed based on the project research results, South African development and environmental policies, and internationally accepted fishery "good governance" norms. Recommendations for institutional and organisational arrangements were presented to the relevant government departments and feedback incorporated into the Volume 1: 'Research Report' recommendations.

Case Study Sites

In this volume, case studies of small-scale fishing activity in 12 selected rural communities are presented. The case study methodology was were designed to provide the primary information required to address the project aim '*to develop appropriate management processes and governance systems for inland fisheries in dams, including the roles and responsibilities of individual households, groups in rural villages and relevant authorities (at tribal, local, provincial and national level).*" The selected sites for the case studies were:

1. Pongola Dam And Floodplain, Kwazulu Natal
2. Voëlvlei Dam, Western Cape
3. Flag Boshielo Dam, Limpopo Province

[1] BRITZ PJ, HARA M, TAPELA B, and ROUHANI Q (2015) *Scoping study on the development and sustainable utilisation of inland fisheries in South Africa. Volume 1. Research Report.* A report to the Water Research Commission. WRC Report No TT 615/1/14.

4. Nandoni Dam, Limpopo Province
5. Makuleke Dam, Limpopo Province
6. Middle Letaba Dam, Limpopo Province
7. Lake Fundudzi, Limpopo Province
8. Zeekoevlei Lake, Cape Town, Western Cape,
9. Driekoppies Dam, Mpumalanga Province ,
10. Masibekela Dam, Mpumalanga Province,
11. Roodekopjes Dam, North West Province,
12. Debe Nek Dam, Eastern Cape Province

The case study research was designed to elicit views from fishers in various local contexts in order to develop recommendations for effective management processes and governance systems. The primary action research approach employed various techniques including stakeholder tables, issues mapping, trend and time lines, role plays, Venn diagrams and stakeholder matrices. Particular attention paid to the issue of gender and the effective management of stakeholder power dynamics within workshops, in order to avoid the workshops serving to further entrench the marginalization of rural primary stakeholders. Following the local and provincial workshops, the findings were synthesized for presentation to policy makers, decision makers and practitioners.

The key findings of the case studies and rapid assessment of fishery activity on dams are summarised below.

A Widespread Livelihood Activity

Small-scale fishing for livelihood purposes in some form was present on most (77%) of water bodies sampled. Most small-scale fishers are poor, but their livelihood strategies are diverse including:

- A primary livelihood of last resort;
- Part of a diversified semi-subsistence livelihood;
- A specialist occupation; and
- Part of a diversified accumulation strategy.

In certain localities, a significant daily income could be generated covering family living costs. All fish were sold fresh to local markets and/ or consumed by the fisher families. The value chain was short with no evidence observed of postharvest value addition. Rural community members also practised recreational fishing, and the fish caught was mainly consumed.

Governance Systems and Fishing Rights

Formal, traditional, or informal resource governance systems existed side by side on many water bodies with varying degrees of cooperation. While small-scale fishing was often tolerated by the authorities, and in some instances actively supported, small scale fishers remained vulnerable to prosecution and their activities were often marginalized by other resource users and stakeholders. Community narratives around inland fishery use, often reflected un-restituted legacies of dispossession and marginalisation from traditional resource access arising from Apartheid and Colonial era dam building, forced removals and land dispossession. Unresolved or growing user conflicts were present on certain water bodies which arose from a lack of recognition of traditional or common pool resource rights, and the lack of capacity of communities to participate meaningfully in existing formal governance institutions. Some form of conflict was reported on 18% of dams surveyed.

A strong sense of a “common pool resource” right was expressed by all local communities, despite varying levels of use by different parties, including outsiders. On dams surrounded by communal land, there was usually some form of active resource management by the traditional authorities. Informal commercial fishing with nets was generally clandestine due to the lack of *de jure* rights for this activity. While environmental conservation departments did not approve of such practices, views by local people varied. In dams where

local people felt excluded, such as Driekoppies Dam, local communities tended to view such practices as legitimate and would abet commercially orientated fishers, including outsiders. Similar observations were made at Flag Boshielo Dam prior to the current waiver on fishing permits outside nature reserves. However, where local people enjoyed equitable access, the sense of 'common pool resource' was stronger (e.g. Makuleke Dam, Nandoni Dam, and Lake Fundudzi). Local communities such as these, who feel they have a 'stake' in looking after the resource, viewed uncontrolled commercial harvesting as 'over-fishing' and therefore actively cooperated in the safeguarding of the resource, particularly from outsiders.

Subsistence and small-scale fishing was regarded as a legitimate activity by local communities. Artisanal gill netting by outsiders with vehicles and boats was however regarded as inequitable and unsustainable. Gill netting by local community members was tolerated on most water bodies, however some concerns were expressed about the sustainability of the method. Fishing permit enforcement by the provincial authorities had generally fallen away, with a few exceptions. A variety of governance and management organisations were observed, including 'no management' (e.g. Nandoni and Masibekela), minimal management (Zeekoevlei, Middle Letaba), traditional institutions (Lake Fundudzi), blended government and traditional institutions (Makuleke), contested management (Pongola Dam, Voëlvlei, and Roodekoppies), state-led co- management (Flag Boshielo) and "top-down" management (Driekoppies).

Indigenous and Local Knowledge

Small-scale fishing on most water bodies was generally not rooted in indigenous fishing traditions, but was an adaptive livelihood strategy. Indigenous knowledge in terms of gear, fishing culture, common pool governance was still present in some communities such as Phongola and Makuleke, but had been adapted to modern circumstances. There was often a coexistence of indigenous and/or traditional knowledge and newer knowledge, often with a blending of the two. Such knowledge related to names of fish species, types of fishing gear and tackle, fishing techniques, fish processing and informal fish markets. Indigenous and/or traditional fishing knowledge and use of fish vary among different communities, ranging from strong fishing tradition and sophisticated fishing techniques (e.g. Maluleke Dam), to taboos and ignorance surrounding the resource (Debe Nek). On the Phongola floodplain, fishing was increasingly seen as being an inferior livelihood and of lower social status compared participation in modern commercial agriculture.

Policy Implications

The case studies documented in this report illustrate that small scale fishing on inland waters is a widespread livelihood activity based on common pool resources, which has been marginalised by the lack of recognition of its socio-economic value, particularly as a food security safety net and economic opportunity net for rural communities. The testimonies of communities demonstrate that the lack of formal fishing rights for livelihood purposes perpetuates Apartheid and Colonial era legacies of inequity in resource access.
The research results demonstrate that small-scale and recreational fisheries have the potential to support the creation of rural livelihoods and decent jobs, provided a policy with clear social and economic objectives is developed. Such a policy will have to be developmentally orientated, based on the historical disadvantage and lack of capacity experienced by rural communities. Given the diffuse nature of inland fisheries which are spread over many small water bodies, and which are mainly used of individual fishers, a devolved co-management approach is recommended in line with international fishery governance norms.

The inclusion of inland fisheries into the DAFF Fisheries Branch mandate has created an appropriate institutional arrangement to develop an inland fisheries policy which is aligned with national developmental goals such the National Development Plan and the DAFF small-scale farmer and fisher development policies. The major institutional and organisational challenges going forward are: 1) the promulgation of empowering policy and legislation, 2) cooperative governance arrangements, 3) capacity building of public sector staff and fishery stakeholder groups, and 4) the establishment of inland fishery co-management organisations. The policy recommendations flowing from the small scale fishery case studies are integrated with the research analysis in Volume 1, Chapter 10 of the WRC inland fishery report.

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Operator, Mr Carel Landman; South African Fishery and Aquaculture Development cc's Mr Patrick Kilroe; Sizabantu Artisanal Fishers Association, Mr King Mthombela (Chairperson); Abathengi BoFish; Federation of SA Flyfishers' (FOSAF's) Dr Scotty Kyle; Prof Kevin Rogers (WITS); Prof Charles Breen (UKZN) Charles Breen; Jozini Local Municipality's Mr T. L. Mathenjwa; Mjindi Farm's Mr Zama Ngubo; Imfunda Yo Phongola's (downstream Floodplain WUA's) Mr Ismael Gumede; Impala (upstream) WUA's Mr Danie Cronje and Mr J. Boonzaaier; and Mr T. S Myeni of the South African Police Services (SAPS). Other contributors includes Ohlalwini Subsistence Fishers' group, local commercial and subsistence farmers and fisher groups, and the traditional leadership of various rural communities of the Nyawo, Gumbi, Jobe, Myeni and Nsinde. Special thanks go to members of the Ntlalavini village community in the Nyawo Traditional Authority area, who voluntarily went a long way to ensuring that their own lived experiences are documented and used in transformative policy engagement. Particular thanks also go to the numerous informal fisher groups and individuals encountered in many fishing villages and fishery sites.

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PROJECT REFERENCE GROUP MEMBERS

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ACRONYMS AND ABBREVIATIONS

ACWR	African Centre for Water Research
CASP	Comprehensive Agricultural Support Programme
CBO	Community Based Organisation
CLR	Communal Land Rights
CPA	Community Property Association
CPR	Communal Property Rights
CMAs	Catchment Management Agencies
CSOs	Civil society organisations
DACE	North West Provincial Department of Agriculture Conservation and Environment
DAFF	Department of Agriculture, Forestry and Fisheries
DARDLA	Department of Agriculture, Rural Development and Land Administration
DDA	Department of Development Aid
DEA	Department of Environmental Affairs
DEAET	Free State Department of Economic Affairs, Environment and Tourism
DEDEA	Department of Economic Development and Environmental Affairs
DRDAR	Department of Rural Development and Agrarian Reform
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
EAF	Ecosystem Approach to Fisheries
EKZN	Ezhemvhelo KwaZulu-Natal Wildlife
FAO	Food and Agriculture Organisation
GIS	Geographic Information System
IDPs	Integrated Development Plans
IGDP	Integrated Growth and Development Plan
IUCN	International Union for the Conservation of Nature
KDNC	Kwazulu Department of Nature Conservation
KOBWA	Komati Basin Water Authority
FOSAF	The Federation of Southern African Flyfishers
LDA	Limpopo Department of Agriculture
LEDET	Limpopo Economic Development, Environment and Tourism
LED	Local Economic Development
MANCO	Management Committee

NEMA	National Environmental Management Act
NEMBA	National Environmental Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Area
NGALAA	Northern Gauteng Artificial Lure Angling Association
NGO	Non Government Organisation
NWA	National Water Act
PFMA	Public Finance Management Act
PLAAS	Institute for Poverty, Land and Agrarian Studies
PRESPA	Pongola River Ecosystem Services for Poverty Alleviation
RMPs	Resource Management Plans
SAALAA	South African Artificial Lure Angling Association
SABAA	South African Bass Angling Association
SACRAA	South African Consolidated Recreational Angling Association
SADC	Southern African Development Community
SADSAA	South Africa Deep Sea Angling Association
SAFAAD	South African Fishery and Aquaculture Development cc
SAFFA	South African Fly Fishing Association
SAFBAF	South African Freshwater Bank Angling Federation
SAFALFA	South African Federation of Artificial Lure and Fly Anglers
SAIAB	South African Institute for Aquatic Biodiversity
SASACC	South African Sports Angling and Casting Confederation
SASCOC	South African Sports Confederation and Olympic Committee
TLGF	Traditional Leadership and Governance Framework Amendment
UN	United Nations
VMC	Voëlvlei Management Commitee
WFW DWAF	Working for Water, Department of Water Affairs and Forestry)
WPALAS	Western Province Artificial Lure Angling Society
WRC	Water Research Commission
WUA	Water Users Association

1. INTRODUCTION AND METHODOLOGY

This volume describes small-scale fishing practices in rural communities on inland waters in South Africa. The detailed case studies documented here informed a synthesis of the status and potential of inland fisheries with recommendations for reform of governance arrangements presented in Volume 1 (Britz *et al*., 2015).

A review of indigenous and local knowledge related to inland fishing revealed that traditional fishing practises are still present in some communities, such as the Thembe-Thonga, but are highly dynamic and adaptable to current circumstances (Tapela, 2015). Influences include sociopolitical factors, modern materials, the social status associated with fishing, and economic opportunities. If an inland fisheries policy in support of rural livelihoods is to be developed, it is important to understand the actual and potential role of inland fisheries in rural peoples livelihoods, in order to develop appropriate governance arrangements which address the historical legacies of exclusion of rural communities from aquatic resources, and promote optimal socio-economic benefits. As the literature on inland fishing practises by rural communities is largely anecdotal and dated (Heeg and Breen, 1982, 1984; Harries, 1984; McCafferty *et al.*, 2012), a survey of inland fishing practices on state and private dams and selected natural water bodies was undertaken as part of a solicited Water Research Commission baseline and scoping study on the development and sustainable utilisation of storage dams for inland fisheries and their contribution to rural livelihoods.

This report presents the research findings from a survey of twelve selected case studies of inland fisheries in six provinces, and a site visits to a further 50 dams to categorise the existing fishery uses.

1.1 Methodology

A team of researchers and post-graduate students conducted a series of field surveys from the University of the Western Cape Institute for Land and Agrarian Studies (PLAAS) between 2011 and 2013. In order to define case study selection criteria and substantive selection of specific sites, the research team consulted extensively with relevant actors in key stakeholder organisations, members of the WRC Reference Group, collaborating colleagues at Rhodes University, and the South African Institute for Aquatic Biodiversity (SAIAB). In order to profile the contexts that future fishery governance development processes would have to address, the twelve case studies, were selected using the following criteria:

- A provincial spread, namely, Limpopo, Mpumalanga, KwaZulu-Natal, Western Cape, Eastern Cape and North West Provinces.
- Existence of fishing activity and fishery type.
- Demographic and socio-economic conditions.
- Resource use issues.

Relatively detailed insights were obtained into the characteristics of indigenous knowledge and current subsistence, commercial and recreational fishing techniques and practices for utilising fish in storage dams in selected rural areas and one urban locality of South Africa.

It was recognised in the research design stage that 12 dams is a small sample of the over 3000 dams in the South Africa. Thus the research findings of the 12 case studies were complement a rapid appraisal of fishing activity on fifty dams conducted by the Rhodes University team (Appendix 1). The rationale for the two-tier research approach was that while rapid appraisals of fishing activity on a relatively large number of dams provided the requisite broad overview for a national baseline and scoping study, the detailed research appraisals performed in the case studies were required to profile the human dimension of small scale inland fisheries and to identify governance issues requiring reform.

The research objectives were to:

1. Identify indigenous knowledge, techniques and practices in and around inland fisheries; and
2. Determine the current subsistence, recreational and commercial uses and users of the dams as well as fishing techniques and practices.

Recognizing the need to link this research to other components of the broader national baseline and scoping study, the researchers sought insights from key institutional stakeholders and resource at the study sites.

A livelihoods approach Inland fishing practises by rural communities can be undertaken for diverse purposes ranging from recreation to commercial sale. Smith *et al.* (2005) proposed a livelihoods-based typology of inland fishers (Table 1) which identifies four categories of fishers based on their livelihood strategy, visibly:

i. A primary livelihood of last resort;
ii. Part of a diversified semi-subsistence livelihood;
iii. A specialist occupation; and
iv. Part of a diversified accumulation strategy.

The implication for the envisaged inland fisheries policy is that a better understanding of the livelihood functions of inland fisheries will enable the design of interventions that are more appropriately targeted to differing fisher requirements. The classification is useful in demonstrating that inland fishing is not always a livelihood of 'last resort' but can play a role in a range of livelihood activities. An understanding of the potential role of inland fisheries in supporting rural livelihoods also helps to broaden the fishery management focus away from the traditional preoccupation with fish stock conservation, towards the adoption of a more diverse and flexible range of measures that are tailored to local priorities and conditions (Smith *et al.*, 2005). The net effect of a livelihoods-based definition of fisher categories is that it ensures that "poor people can access the benefits of inland fisheries whilst achieving conservation objectives" (Smith *et al.*, 2005).

Table 1 Livelihood functions of fishing as household incomes rise and livelihood strategies develop

Livelihood Strategy	Livelihood Functions of Fishing
'Survival'	• Subsistence (food production and income) • Nutrition (protein, micro-nutrients, vitamins)
'Semi-subsistence' diversification	• Own consumption (food security and nutrition) • Complementarity in labour use with farming • Means for barter, or for participation in reciprocal exchange and social networks • Occasional cash source • Diversification for: ▪ Labour and consumption 'smoothing' ▪ Risk reduction ▪ As a coping strategy/buffer against shocks
'Specialization' (as fishers)	• Market production and income • Accumulation
'Diversification for accumulation'	• Accumulation • Retention in a diversified accumulation strategy • Recreation

Source: Smith *et al*. (2005)

This study used the typology of Smith *et al.* (2005), which provides an analytical framework that categorises the diversity and dynamism of livelihood functions of inland fisheries. This is useful for policy formulation and implementation.

This definition of fisher categories is arguably analogous with the four DAFF defined categories for smallholder irrigation farmers namely, the 'subsistence farmer', the 'smallholder farmer', the 'equity labourer', and the 'business farmer' (Denison & Manona, 2007).

1.2 References

BRITZ PJ, HARA M, TAPELA B, and ROUHANI QA (2015) *Scoping study on the development and sustainable utilisation of inland fisheries in South Africa. Volume 1. Research Report.* A report to the Water Research Commission. WRC Report No TT 615/1/14.

DENISON J, and MANONA S, (2007) *Principles, Approaches and Guidelines for the Participatory Revitalisation of Smallholder Irrigation Schemes – Volume 2 Concepts and Cases.* Water Research Commission. WRC Report No TT 309/07. 340p.

HARRIES, P. 1984. A Forgotten Corner of the Transvaal: Reconstructing the History of a Relocated Community through Oral Testimony and Song. Paper presented in the History Workshop on *Class, Community and Conflict: Local Perspectives*, held at the University of the Witwatersrand from 31 January to 4 February.

HEEG J and BREEN CM (1982) *Man and the Pongolo Floodplain. (A report of the Committee for Inland Water Ecosystems*. National Programme for Environmental Sciences) South African National Scientific Programmes Report No. 56.

HEEG J, and BREEN CM (1994) Resolution of conflicting values on the Pongolo River Floodplain (South Africa). In: Patten, B., Jorgensen, S. & Dumont H. (Eds.), *Wetland and Shallow Continental Water Bodies Volume 2*. The Hague (Netherlands): SPB Publishing.

MCCAFFERTY JR, ELLENDER BR, WEYL OLF, BRITZ PJ (2012) Literature review on the use of water resources for inland fisheries in South Africa. *Water SA* 38(2): 327-344.

SMITH LED, NGUYENKHOA S, AND LORENZEN K (2005) Livelihood functions of inland fisheries: Policy implications in developing countries. *Water Policy* 7: 359-383

TAPELA B (2015). Indigenous Knowledge In Inland Fisheries In South Africa. In: Britz PJ, Hara M, Tapela B, Rouhani Q (2015) *Scoping study on the development and sustainable utilisation of inland fisheries in South Africa. Volume 1. Research Report*. A report to the Water Research Commission. WRC Report No TT 615/1/14.

2 OVERVIEW OF UTILIZATION OF INLAND FISHERIES IN RURAL COMMUNITY SETTINGS

In this chapter, a synopsis of the main findings from the 12 case studies and dam survey is presented.

2.1 Summary of Activity on Surveyed Dams

A total of 64 dams were surveyed for fishing activity during the case studies and the rapid survey (Appendix 1). Subsistence fishing activity was recorded on 77% of dams, artisanal/ small scale commercial fishing on 40% and recreational fishing on 69%. Reports of some form of conflict between fisher user groups was reported on 18% of dams surveyed.

Table 2 Prevalence of fishing activity and user conflicts on 64 dams surveyed.

Dam	Fishery Activity			User Conflict
	Subsistence	Artisanal	Recreational	
Eastern Cape Province				
Pikoli Dam	x	x		
Mankazana Dam	x	x	x	yes
Tyefu Dam		x		
Bass Dam	x			
Lost Dam	x	x	x	yes
Nteyetnana Dam	x			
Mthatha Dam	x			
Dimbaza Dam		x		
Cata Dam			x	
Mnyameni Dam			x	
Sandile Dam	x		x	
Kat River Dam	x			
Binfield Dam	x		x	yes
Debe Nek	x	x	x	
North West Province				
Disaneng Dam	x	x	x	
Setsumo Dam	x	x		
Lotlamoreng Dam	x	x		
Spitskop Dam	x	x	x	yes
Roodekopies Dam	x	x	x	yes
Northern Cape Province				
Vaalharts Weir	x	x	x	
Graspan Pan		x	x	
Mpumalanga Province				
Mbambiso Dam	x	x		
Inyathi Dam	x			
Shiyalongubo Dam				
Doringhoek Farm Dams				
Casteel Dam	x	x		

Dam	Fishery Activity			User Conflict
	Subsistence	Artisanal	Recreational	
Champagne Farm Dam	x			
Dingsleydale Farm Dams				
Nyakha Dam	x		x	
Witklip Dam	x		x	
De Gama Dam	x		x	
Klipkoppie Dam	x		x	
Primkop Dam			x	
Agricultural Research College Dam	x		x	
Vygeboom Dam			x	
Nooitgedacht Dam	x		x	
Dreikoppies Dam	x	x	x	yes
Masibekela Dam	x	x	x	yes
Limpopo Province				
Chuniespoort Dam	x		x	
Nkumi Dam	x		x	
Ebenezer Dam	x		x	
Metz Dam			x	
Nsami Dam	x			
Albasini Dam	x		x	
Molepo Dam	x			
Turfloop Dam			x	
Sheshego Dam	x			
Nzhelela Dam	x		x	
Alicedale Estate Dam	x		x	
Flag Boshielo	x	x	x	yes
Nandoni Dam	x	x	x	yes
Makuleke Dam	x	x	x	
Middle Letaba Dam	x	x	x	
Fundudzi Lake	x			
KwaZulu Natal				
Jozini Dam	x	x	x	yes
Phongola Floodplain	x	x	x	yes
Western Cape Province				
Voëlvlei Dam			x	
Zeekoievlei Lake	x		x	
Theewaterskoof Dam			x	
Clanwilliam Dam			x	
Free State Province				
Bloemhof Dam	x	x	x	
Gariep Dam	x	x	x	
Totals	48	25	43	11
Percentage	77	40	69	18

2.2 Fisher Demographics

The case studies revealed that all racial groups utilize fisheries located close to rural local communities, often irrespective of *de jure* governance of access rights, which in many contexts tended to be unclear. Fishers and anglers were socio-economically differentiated according to socio-economic class, race, gender and age.

Most fishers male, but subsistence fishers included a few women, who were very poor, fished for food security and either headed their households or were reportedly neglected or under-supported by spouses working in urban centres further afield, such as in Gauteng Province and Polokwane.

Survivalist fishers were often the poorest and most vulnerable black rural men, women and children.

Livelihoods fishers were mainly black and resource-poor, but also included a number of white fishers from outside rural communities.

Commercially-oriented fishers included affluent black and white entrepreneurs, who fished formally and informally.

While recreational anglers were often portrayed as being white, the study identified many black, coloured and Asian formal and informal anglers from within and outside of rural communities.

The observed diversity of fishers required that definitions of the three broad categories of recreational, commercial and subsistence fisheries be further qualified to enable institutional interventions to be predicated upon nuanced understandings of indigenous fishing knowledge and practices as well as current practices and techniques. Hence, this section of the report presents a typology of observed primary users of inland fisheries.

2.3 Profile of Inland Fisher Livelihood Categories

Using the categories of fishers and anglers based on the classification of Smith *et al.* (2005), six groups of small scale fisher livelihood were discerned, visibly;-

- subsistence fishers,
- livelihoods-orientated subsistence fishers,
- informal recreational anglers,
- locally based resource-poor artisanal fishers,
- externally based commercial fishers and,
- externally based formal recreational anglers.

A profile of each is provided below based on the case study observations.

2.3.1 Survivalist Subsistence Fishers

Survivalist subsistence fishers were mostly the poorest among male and female members of communities, who used hand lines, fish traps made of sisal fibre and plastic netting, and rudimentary home-made rods with basic tackle, such as twine and hooks, to catch mostly small fish for their own consumption. The women (and children) tended to fish further away from the fishing spots that were dominated by men. A few men fished in fishing spots close to those of women. These fishers mostly fished for food security, principally to supplement their household requirements for protein. Although some of the women were recipients of child supports grants, they had no other sources of income and could therefore not afford the cost of meat sources of protein, such as beef and chicken.

2.3.2 Livelihoods-Orientated Subsistence Fishers

Livelihoods orientated subsistence fishers were mostly unemployed and/or landless rural men, who practised fishing as a livelihood. The fishers reported that they mostly catch tilapia (or bream), catfish and carpenter or silver fish, among other species. They sold surplus catch along the roadside and took the rest home either to eat or to sell or donate to other members of the local community. These fishers owned

fishing rods, hand lines and hooks, which were purchased from retail outlets. However, they clearly stated that their fishing tackle reflected their lack of financial resources to buy adequate equipment for catching larger fish found in dams. They also stated that their knowledge of correct fishing techniques was inferior to that possessed by externally-based recreational anglers, whom they often observed and interacted with.

2.3.3 Informal Recreational Anglers

Informal recreational anglers were people from local communities, who practised angling as a sport and pastime and were not affiliated to any angling clubs and associations. They used store-purchased and home-made fishing rods, hooks and bait. During day time, they frequently angled from fishing spots below dam walls, alongside subsistence fishers but not commercially orientated fishers, whose activities were said to be largely conducted at night. Some of the informal recreational anglers also used fishing spots along dam shores and they paid entrance fees to gain access to fisheries.

Many of the informal recreational anglers took their catch home and some released the small fish back into the water. However, they took fish home not because they critically needed to survive or subsist on it, but as a sort of 'reward' for a day spent in the outdoors. Like the livelihoods orientated subsistence fishers, informal recreational anglers expressed a concern that they lacked adequate knowledge of correct catch-and-release techniques. A number of these anglers also expressed a desire to own appropriate fishing gear and tackle, but had no financial means and insufficient knowledge.

In some contexts, such as Lake Fundudzi, Flag Boshielo and Makuleke, they also voiced a vision to establish recreational fishing-cum-picnic sites on land adjacent to well-known fishing spots and thereby generate revenue for developing their communities. Informal recreational anglers stated that they recognized the need to obtain permission from traditional leadership to use land close to the dams and riverine fisheries. Other major challenges they faces were the lack of clarity about appropriate government departments to approach for technical assistance and funding for such projects.

2.3.4 Small-Scale Artisanal Fishers

Small-scale commercially orientated artisanal fishers were largely resource-poor and unemployed men and women from rural local communities around the dam. It was not clear to what extent landlessness and/or joblessness, which were generally rife in many rural communities, contributed to the ranks of these fishers. The fishers used various types of nets, including beach seine nets, gill nets and other home-made nets. Some of the fishers used both nets and fish traps, as well as canoes and rafts. Both men and women fishers were involved in 'illegal' net fishing practices. While seine nets were mostly used by men, women fishers often used bunched up dry sisal cords, basket traps made of chicken wire and/or plastic netting, which they put into the water to trap fish. Small-scale commercially-orientated net fishers relied on informal markets along local roadsides, at road intersections and within local communities.

While there was a prevalence of "poaching" or gill net fishing activities by resource-poor commercially orientated fishers from local communities around many dams, respondents were reluctant to disclose the extent to which such practices were conducted by local fishers. The disclosed characterization was that such fishers conducted their fishing activities at night and brought home large catches of fish, which they sold within local communities and in small urban settlements nearby. Members of communities were also reluctant to mention the fishing techniques used by gill net fishers, save that they caught significantly more fish during the night time than all anglers did during daytime, and that they earned significantly high incomes from selling fish.

Small-scale commercially-orientated net fishers stated that they constantly tried to evade being apprehended by environmental compliance and enforcement agencies, which patrolled both dam shores and rivers. In some cases such as Nandoni, Makuleke, Phongola and Masibekela, where formal organisations were non-existent, invisible and/or ineffective, traditional leaders actively discouraged illegal gill net fishing practices. In the cases of Nandoni and Makuleke, this enforcement signified the emergence of a local common property regime. In the case of Flag Boshielo and various other dams in Limpopo Province, the environmental agencies operating under auspices of the Limpopo Economic Development, Environment, and Tourism's (LEDET) Community Outreach Programme had elicited the cooperation of various local communities in different districts and

municipalities in the apprehension of net fishers from outside the rural communities. It was not clear to what extent local people also reported illegal net fishing by members of their own communities, nor the degree to which local people continued to collaborate with larger commercial fishers from further afield. Consequently it was also not clear whether or not the current endemic activities by small-scale commercially orientated artisanal fishers, indicated an increase in prevalence or simply an increase in the visibility of this practice.

2.3.5 Commercial Fishers

Commercial fishers were mostly male 'outsiders', who lived in places far away from dams and were either more affluent or better resourced than local small-scale commercial fishers. Their operations were mobile, organized with investment in dedicated gear. This comprised of fleets of gill nets, boats, freezers and vehicles.

The commercial fishers reportedly fished from all formal and informal access points, namely private farms, Department of Water Affairs premises, nature reserves, recreational fishing camps and riverine pools immediately below dam walls. Such fishers tended to camp beside dam shores or river banks for between one and several days. They rented space and electricity for their chest freezers and formally sourced fishery access, camping facilities and electricity and other services from registered fishing camps and eco-tourism resorts located close to dams. Those fishers who utilized informal fishing spots, such as riverine pools below dam walls, reportedly made informal arrangements to "plug" their electrical deep freezers in homes of members of local communities. They paid agreed amounts for the use of electricity and space in these homes.

After fishing, the larger commercial fishers transported their catch in bakkies or four-wheel drive vehicles to distant urban markets. In Limpopo Province, such markets include larger towns, such as Tzaneen, Polokwane, Phalaborwa and Groblersdal, among others. Given that, when apprehended, these fishers were often caught with up to 5 to 6 nets that were 500m long and catch between 400 and 500 fish each, the gross profit margins of large scale commercial farming needed to be examined.

2.3.6 Formal Recreational Anglers

Formal recreational anglers were mostly white people, who were members of angling clubs and associations. These anglers utilized many of the identified popular fishing areas around dam shores. They also took part in numerous angling competitions and tournaments that were hosted in dams each year. These recreational anglers came from areas ranging from local farms and towns to places much further afield. Historically, formal recreational anglers enjoyed greater formal access to Flag Boshielo Dam fishery, through fishing permits, than members of rural local communities.

These anglers were better resourced than informal recreational anglers from rural local communities. They had better fishing gear and tackle, such as boats and flotillas, expensive fishing rods and specialized lures, among other forms of gear and tackle. They invested in high value related equipment such as vehicles, boat trailers, freezers, caravans, tents, gas appliances and outdoor furniture. Formal recreational anglers also had the financial resources to stay in formally registered resorts and camps, where there was greater security, electricity, water, ablutions and other facilities. They were considered by local anglers to have better knowledge of fishing techniques. They practiced catch-and-release techniques, often releasing some of the fish and taking a portion of their catch home. However, it was not clear to what extent recreational anglers consumed, sold and/or donated their catch.

2.4 Current Fishing Practices and Techniques

The study revealed that a variety of endemic and exotic fish species are caught in inland fisheries located in close proximity to rural communities. Such species included tilapia, carp, black bass, catfish, eel, and silver fish, among others. Indigenous names of fish, fishing techniques and fishing practices were used in various localities and varied according to language and local vernacular (Table 2). Similarly there were specific indigenous, traditional and locally innovated terms for fishing techniques, gear and tackle as well as raw materials used to make these. For example, nets were named *Mambule* in various language contexts. Fishing rods were termed *tshinjovho* in Venda, *tove* in Tsonga and *lehlaka* in Sepedi. Barrier traps were known as *sefo* in Sepedi, *sole* in Tsonga and *mona* in Tembe-Thonga communities. Basket traps were known as *Xirongo* in Tsonga and *imfonya* among the Tembe-Thonga.

Table 3 Glossary of indigenous terminology

Province	Dam	Village	Word/Name	Language	English Translation	Latin Name	Description
Limpopo	Middle Letaba	Xihimu	Ntoma	Shangaan/Tsonga	Jackal berry	*Diospyros mespiliformus*	
Mpumalanga	Masibekela	Masibekela and neighbouring villages	sbero				Long-nosed fish
			umphoselo		Bait e.g locust		
			amathumbu enkuku		Chicken guts		
			induku		Rod		
			machan				Fish species, common name unknown
Kwazulu Natal	Pongola floodplain	Skhemelele	imfonyo	Zulu			Basket used to catch fish
			induku	Zulu			Spear
			ikhukhula	Zulu			A sheet with holes (shade cover for parking lots
North West	Roodekopjes		getle	Venda	Bream/Mozambique tilapia	*Oreochromis mossambicus*	
			blou karper	Afrikaans	Mozambique tilapia	*Oreochromis mossambicus*	
			muchekecheke	Venda			Fish species, common name unknown
Limpopo	Flag Boshielo	Phetwane	lehlaka	Sotho/Sepedi			Fishing equipment made of reeds, fish line and a hook tied to the end
			sefu	Sotho/Sepedi			A trap with a small hole to let fish in but the fish cannot go out
			modibo	Sotho/Sepedi			Tree that grows along the river
			kerelbol	Afrikaans	Mozambique tilapia	*Oreochromis mossambicus*	

In many of the case study areas, the history of rural people's inland fishing activities pre-dates the development of water storage dams, when local people fished in rivers, impoundments and floodplain pans. However, with dam development and social transition over time, traditional fishing practices and techniques, such as the *sefo* 'basket' trap and the nets made from *modibo* tree branches, have since disappeared, while newer subsistence, recreational and commercial fishing practices and techniques emerged.

Earlier versions of the newer fishing practices and techniques include the use of gear and tackle that combines locally available natural resources and store-bought man-made raw material. An example is *lehlaka*, which is a rudimentary homemade fishing rod made of a combination of reeds cut from river banks and lines purchased from stores in Marble Hall. Such hybrid forms still prevail particularly among resource-poor survivalist and livelihoods orientated subsistence fishers from local communities. However, the fact that these fishers commonly express aspirations to own store-bought fishing rods, for example, seems to suggest that the more modern 'ready-made' forms are gradually replacing hybrid forms. Indeed, this study's research findings show a greater visibility of store-bought fishing rods, lines and hooks than of forms such as *lehlaka*. However, further in-depth studies are required to determine definitively the current coexistence of the earlier and later forms of gear and tackle.

Apart from the ready-made fishing rods mentioned above, later versions of the newer fishing practices and techniques currently also include the use of store-bought hand lines, hooks, seine nets, gill nets and other nets, boats, canoes and flotillas, among others. Such gear and tackle currently coexists with the more recently emerged local forms of innovation by fishers who eke livelihoods and/or operate informal commercial enterprises outside the ambit of existing laws. These include metal-and-sisal rafts, which used by commercially-orientated male and female net fishers, and sisal and plastic fibre traps, which are mainly used by local female subsistence fishers. Although traditional bait was used alongside artificial lures, recreational anglers preferred the latter and commercially-bought organic bait while subsistence fishers generally used earthworms, chicken livers, pap, dregs from traditional beer brewing, grasshoppers and termites. The fishers choice of bait depended on the targeted fish species.

Local taboos pertaining to inland fisheries varied according to context. Lake Fundudzi had the strongest and well-developed system of indigenous knowledge, taboos, cultural beliefs and mysticism, which was intricately inter-woven with traditional power issues, folk ecology and narratives about social cohesion, well-being, sociopolitical stability and ecosystem sustainability. The result of such beliefs was that no fisher went to the lake during the night, and outsider fishers were similarly deterred. The latter also tended to avoid the lake during daytime. Other rural fishing contexts had relatively less pre-occupation with such beliefs, myths and legends and evidence pointed to erosions of their currency. For example, among Venda-speaking peoples living around Mutshindudi Dam to the south-east of Lake Fundudzi, it was *taboo* for women to fish (Stayt 1931 in van der Waal, 2001). Recent indications (van der Waal, 2001) were that with passage of time, changes in traditional fishing knowledge and practices resulted in freshwater fish becoming more readily caught and consumed by predominantly but not exclusively bymen.

By contrast Xhosa people of the Eastern Cape had a cultural belief that their ancestors resided beneath the water as river spirits or '*abantu bomlambo*', which discouraged them from practicing and consuming freshwater fish but was not necessarily an obstacle for aquaculture or fisheries development (Tapela, 2015). Similar to the Xhosa, Tsonga-speaking Makuleke people believed that water spirits embodied in snakes safeguarded natural springs. However, this did not temper with the Makuleke's affinity to fishing and consuming freshwater fish but, rather, engendered a strong awareness of the need to safeguard aquatic ecosystems. The Tembe-Thonga upheld stronger cultural aversion to consumption of tiger fish than catfish.

Regarding types of inland fisheries, traditional subsistence-orientated fisheries have over time become diversified to include newer subsistence, commercial and recreational fisheries. Exploitation has also broadened to include both local people and outsiders. Such shifts possibly mean that the search for appropriate local institutional arrangements for the governance and management of inland fisheries in rural community contexts will be a more complex undertaking than afforded by conventional top-down, techno-centrist conservation approaches.

The governance challenges are linked to a combination of factors, including the erosion of traditional (or indigenous) institutions, knowledge systems and resource management and exploitation practices; insufficient knowledge of current fishing practices and techniques as well as requisite management regimes and governance system; lack of clarity on the requisite structure of access rights; power dynamics amid the diversity of stakeholder interests; and the emergence of predatory forms of uncontrolled resource exploitation. In light of these, there is a need to avoid romanticist notions that a reversion to embedded traditional resource management and governance systems will be effective. In any case, levels of social cohesion in many rural communities around the dam show some degree of fracturing due to the historical processes by which these communities were constituted and the on-going impacts of the broader economic, social and political milieu. Appropriate governance options need to be developed through facilitated participative processes which take into account the legacy of disadvantage of rural communities.

2.5 Income from Fishing

Income from fishing was largely context specific and depended on the orientation and investments by fisher. Generally, income varied from R250 to R550 per 25L bucket for livelihoods-orientated subsistence fishers, who fished a few times a week. Small-scale commercially-orientated fishers, who practiced semi-subsistence diversified fishing, generated incomes of between R150 and 250 per day and fished for 3 to 5 days per week, thereby earning between R1800 and 4000 per month during good fishing seasons. Other better resourced and full-time small-, medium and large-scale commercial fishers reported earnings of between R500 and R2500 per day, 6 days per week, which translated to between R12000 and R60 000 per month. Survivalist fishers largely caught fish for their own consumption and therefore, for these, further research would need to determine income through proxy variables. For all types of subsistence (and artisanal) fishers, such incomes make critical contributions to the socio-economic status, food security and well-being of affected rural and local households. More in-depth research, however, is required to verify and refine these statistics, which were largely compiled through indicative appraisals of a few fishers and fisher households.

The economic survey by Leibold & Van Zyl (2008) indicated that recreational angling and sport fishing generate a significant financial contribution (approximately R9 billion per annum) to the South African economy. Tourism ventures associated with recreational fisheries, such as the trout fishery at Rhodes village and fishing charter operations on Phongola Dam, for example, support full time businesses. Other examples include the numerous privately-owned, state-owned and community-owned holiday resorts and fishing camps, which are found in the vicinity of many of the observed water storage dams across the country. With specific respect to dams that were constructed through public investments, it is worth noting that while such enterprises continue to derive significant financial benefits from utilizing state-funded infrastructure, recreational fishery benefits are not equitably shared with the impoverished rural communities, who occupy the backwaters of dam hinterlands. In essence, by retaining rather than distributing the huge financial turn-over generated by the recreational and sport angling sub-sector, these current beneficiaries ‘capture’ the value of public expenditure without paying other ‘valid but marginalized’ beneficiaries for their foregone use of such resources. Contemporary international ‘best practice’ for dam development and ‘good governance for Integrated Water Resources Management (IWRM) require dam authorities and/or governments to institute and implement fair and equitable benefit-sharing and compensation measures. The South African Constitution also requires the redress of results of past discrimination, which includes discriminatory access to benefits from recreational and other inland fisheries. There is therefore a valid case for tapping into ecosystem services and value chains of the recreational fisheries sub-sector as a means to enhancing rural livelihoods. Towards this end, further research will be required to explore possible options for ensuring that the distribution and broadening of access to such benefits is done in ways that sustain fishery ecosystems, fishery productivity, livelihoods and various economic sectors, including existing and prospective recreational sectors.

2.6 References

ANDREW TG, ROUHANI QA, and SETI S (2000) Can small-scale fisheries contribute to poverty alleviation in traditionally non-angling communities in South Africa? *African Journal of Aquatic Science* 25: 49-55

ELLIOT A (1970) *The magic world of the Xhosas*. Collins. Johannesburg

LEIBOLD M and VAN ZYL CJ (2008) The economic impact of sport and recreational angling in the republic of South Africa, 2007: Extensive Report. In: *Report of project to scientifically determine the overall Economic Impact and Strategic Value of Sport and Recreational Angling in the Republic of South Africa.* Development Strategies International PTY LTD, Consultants to Business and Government. 49p

SMITH LED, NGUYENKHOA S, AND LORENZEN K (2005) Livelihood functions of inland fisheries: Policy implications in developing countries. *Water Policy* 7: 359-383

TAPELA B (2015). Indigenous Knowledge In Inland Fisheries In South Africa. In: Britz PJ, Hara M, Tapela B, Rouhani Q (2015) *Scoping study on the development and sustainable utilisation of inland fisheries in South Africa. Volume 1. Research Report*. A report to the Water Research Commission. WRC Report No TT xx/xx/15

VAN DER WAAL, BCW (2001) Fish as a resource in a rural river catchment in the Northern Province, South Africa. *African Journal of Aquatic Science 2000* 25: 56–70

3 PONGOLA DAM AND FLOODPLAIN, KWAZULU NATAL

Figure 1 Phongola Dam

3.1 Introduction

The research was undertaken between 26 March and 29 March 2011. The study was conducted by prospective doctoral researcher, Ms Vimbai Jenjezwa. She was assisted by Mr Ronnie Radebe, who is the deputy chairperson of the Water User Association for Pongola Dam. Radebe spoke to the fishing organizations and communities prior to the researcher's visit. Since he interacts with various community structures and members at various levels, this made it easier for the researcher to approach and interview key respondents.

3.2 Research Methodology

Primary data collection methods included questionnaires, in-depth interviews and field observations. Interview schedules differed for various stakeholders namely, fishers and intermediary institutional stakeholders. Fish sellers were interviewed mainly on a fisher questionnaire with a few additional questions on the selling of fish. There was also a household questionnaire used to determine the socio-economic status of both fisher and non-fisher members of the community. The researcher complied with ethical guidelines for social research by explaining the purpose of the research and assuring the participants that the information that they supplied would not be used for anything other than research. The participants were also informed that they were free not to divulge any information they were not comfortable with providing and/or disclosing.

Problems encountered during data collection included difficulty in getting a responses from the management authority responsible for the fishery, Ezemvelo KZN Wildlife. Although the researcher telephonically contacted Mr Ntsele from Ezemvelo KZN Wildlife, he was unable to respond to the questions. Mr Ntsele referred the researcher to a Regional Ecologist representing the Resource Use division because he said he could not

answer the questions. However, due to on-going court cases and tensions between Ezemvelo KZN Wildlife and the fishers, this institution was reluctant to respond to the questionnaire. After explaining the nature of the research, principal researcher (Dr B. N. Tapela) and the researcher sent two follow up emails and called the representative, Ms Catherine Hanekom, who subsequently answered the questionnaire as well as provided useful documentation. The next section describes the background of the study area including information on the location and socio-economic profile.

3.3 Background to the Study Area

Pongola dam lies along the Pongola River with the dam wall close to Jozini, a town in the northern part of Kwazulu Natal Province. The dam lies to the west of the Lubombo Mountains with its wall built across the deep Pongolapoort Gorge. The Pongola dam and floodplain are located within Jozini Local Municipality which is part of Umkhanyakude District Municipality. Nearby towns include Mkuze, Ubombo and Ingwavuma. The types of land use in and around the dam include tourism, agriculture, game farming and settlement (Draft IDP Review, 2010; van Vuuren, 2009).

The Pongola Floodplain is the only extensive floodplain in South Africa incorporating a series of pans. The floodplain ecosystem consists of a complex pattern of interacting flood dependant components which are derived from two principle sources: the terrestrial source and the aquatic source. As water levels fluctuate, terrestrial components are incorporated into the aquatic system. The Pongola floodplain has high biological biodiversity. Animals found in and around the floodplain include waterfowl, hippopotamus and crocodiles. The crocodiles are mainly found in Ndumo Reserve hence they do not directly compete for fish with humans. The local population has a long tradition of utilising the Pongola River and floodplain for its natural food resources (such as fish) and growing subsistence crops[2].

The Pongola dam and floodplain are important sources of water and food. People in the floodplain depend on the water from the pans for fish and irrigation for their gardens, which supply them with mielies, grains and vegetables. The poverty levels are still high in the area and there is need for empowerment of community members through skills development and job creation.

3.4 Historical Background

The construction of Pongola Dam began in 1963. The dam was constructed so as to provide irrigation water for sugarcane fields on the Makatini Flats, a highly fertile area adjacent to the floodplain on both sides of the river. The dam is under the authority of the Department of Water Affairs (DWA). Fish has always been an important source of food for people in the floodplain. The locals used baskets called *imfonyo* to catch the fish. The construction of the dam resulted in regulated water releases to the floodplain. Between 1973 and 1987, the DWA operated the dam without consultation of stakeholders and there were growing concerns among scientists about the need for flood releases to maintain ecological services in the floodplain. Scientists proposed a regime aimed at maintaining ecological services but having a minimal effect on irrigation potential. However, the increasing cultivation activities of local farmers resulted in specific requests for flood releases. This led to an unstructured process of negotiated flood releases. This unstructured decision making in a policy vacuum led to a decline in fish stocks. Large periods of time between flooding led to loss of water through evapotranspiration resulting in the death of aquatic organisms (van Vuuren, 2009). Conflicts between agriculturalists, grazers and fishermen arose due to the lack of certainty about flood releases. These parties were unable to manage access to the water resource. In order to improve communication with the DWA, the community developed Water User Associations (WUA). The WUA was established in terms of the National Water Act (NWA) which emphasised equitable, sustainable and integrated water use. Decision making was delegated to lower levels to facilitate for community based resource management. Although the frequency of flood releases were agreed upon, the WUA has played a less pro-active role than expected as they were not properly capacitated to drive water resource management processes (PRESPA Report, 2009).

[2] Draft IDP Review, 2010; ***www.jozini.org.za***

3.5 Challenges of Devolved Resource Governance

This study confirmed findings by the Pongola River Ecosystem Services for Poverty Alleviation (PRESPA) Report (PRESPA REPORT, 2009). These are that:

a The WUA is governed by a management committee (MANCO) that is accountable to the Minister of Water Affairs and members of the WUA. The MANCO comprises thirty-three members representing various groups of stakeholders ranging from small-scale farmers to commercial irrigators, national and provincial departments, local government, local authorities, civil society groups, international liaison representatives and others. Since the different stakeholders democratically nominate representatives to MANCO, and the executive is elected annually, there has been a strong expectation of democratic representation through the WUA. The institutional structure is also linked to the traditional system of governance, since Amakhosi (Chiefs) nominate representatives to MANCO and the WUA executive committee and Izinduna (Headmen) call meetings to discuss water releases with their constituents in advance of any consultation with DWA on the issue. While effort has gone into setting up the WUA, the structure has been beset with major constraints.

b There has been a mismatch between statutory recognition and expectations, whereby the intended decentralization of water resources management has not happened. Effectively, since 2004, when existing water committees were formalized into a single statutorily recognised structure, intended WUA objectives have not been achieved. Such objectives included collection of fees from WUA members, formulation of a business plan, the raising of other resources privately, and gradual expansion of the remit of the WUA functions from coordinating consultative decision-making for managing flood releases to undertaking measures for the integrated development of the flood plain area. Lack of financial capacity, in particular, has curtailed operations of the WUA.

c There have been asymmetries in WUA operations. Lack of a clear division of roles, responsibilities and mutual accountability between different levels of government has resulted in serious asymmetries of actions and repercussions between the national and provincial levels of DWA, which have undermined the effectiveness of decentralization.

d The disengagement of major official stakeholders from the flood release consultation process has been a constraint. The PRESPA Report (2009) states that despite that the WUA comprises multiple stakeholders from the government at the national, provincial and local levels to ensure a holistic consideration of issues impacting on decisions relating to flood releases from the dam to suit the needs of floodplain communities as well as the interests of the ecosystem at large, in reality, DWA has remained the key governmental authority driving these consultations, with other key departments like environment and agriculture refraining from adopting a proactive role. The latter reportedly promotes commercialization of agricultural practices in the area and aims at interventions for enhancing food security, but is rather less concerned with flood releases required by local communities for floodplain cultivation. Meanwhile, floodplain residents have expressed discontent over the lack of engagement particularly by agriculture officials in floodplain agriculture and view that a lot more could be done by the WUA to regulate and coordinate floodplain cultivation. Conservationists on the other hand regularly worry about the growing effects of commercial agriculture on the ecosystem, and complain that environment officials do not take up this cause in a serious manner when the timing and quantity of flood releases are being debated. While such aspects limit the consultation required for determining an appropriate flood regime, they also undermine the capacity of the WUA to assume a broader role in the interests of the integrity of the floodplain.

The PRESPA Report concludes that although the foregoing constraints detract from the WUA's capacity to play a more pro-active role, it must also be appreciated that there is a generally well institutionalised channel of communication regarding flood release timings that can be effective. Household level research by PRESPA has revealed that ordinary residents connect with the flood release consultation process not just through the formal structures of the WUA but also through traditional leaders and informal community networks. However, there are possible gaps in communication that can disrupt the WUA's day-to-day functioning. There is also a widespread sense that both DWA as well as the WUA committee could do more to serve the interests of the floodplain residents.

3.6 Characterization of Indigenous Knowledge and Current Fishing Practices and Techniques

3.6.1 Findings from Institutional Actors

Institutional actors interviewed for this study included government officials and representatives of an intermediary non-governmental/private organization (NGO/Close Corporation). Government officials were principally Mr Mbongeni Khanyile from the KZN Department of Agriculture and Environmental Affairs' Makhathini Research Station and Ms Catherine Hanekom from Ezemvelo KZN Wildlife.

Two other institutional structures were identified. These were the Federation of South African Flyfishers (FOSAF), which represents organized recreational and sport flyfishing anglers, and Sizabantu, which is a formally constituted organization of subsistence fishers in Pongola Dam. Given that FOSAF and Sizabantu are both primary stakeholder (i.e. fisher/angler) organisations, their views are captured in Section 2.4.2.

At present, formally recognized stakeholders in the Pongola dam are Ezemvelo KZN Wildlife, DWA, KZN Department of Agriculture and Environmental Affairs (DAEA) and the WUA. There is a state of confusion the regarding roles and responsibilities of these stakeholders, which is due to a lack of inter-departmental communication and cooperation at both national and provincial levels. Ezemvelo KZN Wildlife, assisted by the Honorary Officer group, was mandated to enforce compliance in respect of biodiversity and recreational activities and impacts (based on the 1980 agreement between DWAF (now DWA) and the NPB – overlapping functions now with the WUA). DWA have transferred the management of the recreational activities and regulatory authority to the WUA. The WUA was established and formally appointed 4 years ago but have not acted upon executing their mandate for various reasons.

3.6.2 Ezemvelo KZN Wildlife

Ezemvelo KZN Wildlife confirmed that the Pongola dam is owned by the State, including the land adjacent to the water body known as the Admiralty Reserve (Hanekom, 2011). The land itself is owned by a combination of State, private landowners and communal land managed by Traditional Authorities. The Department of Water Affairs (DWA) administers the laws governing access to the water body and its biota. Ezemvelo KZN Wildlife is the mandated Government body mandated with biodiversity conservation, and thus responsible for management of the fishery in terms of all land ownership categories. This means that even if the land itself is owned by a private individual, access to the water body is subject to DWA regulations and legislation (such as the requirement for a skippers license for all boat operators in both a marine and freshwater environment), while Ezemvelo KZN Wildlife is responsible for the management of the biodiversity. Ezemvelo has authority over the utilisation of all fish species and the enforcement of legislated fishing methods. This includes recreational tiger fishing and charter operations by private landowners and the new Jozini Tiger Lodge, and artisanal fishers from local communities, who prefer most other fish species for consumption.

Previously freshwater fishing licenses were required under the auspices of the then Natal Parks Board, but are no longer being issued. A request for the formal withdrawal in 1996 was upheld, and since then no licenses have been issued. The the Kwazulu Department of Nature Conservation issued an experimental gill net permit in the 1980s to one individual to test the feasibility of gill netting in the dam, but this subsequently lapsed and has not been re-issued. At the time the permit was monitored, catches monitored and recorded and the permit holder monitored. In 2005, a Water Users' Association (WUA) was set up for the Pongola dam. All sectors of society are represented in the WUA. The Department of Water Affairs have transferred the management of all recreational activities and regulatory authority to the WUA. However, the WUA has been largely ineffective in the cooperative management of the dam and has not acted on its authority.

In order to monitor the fishers' compliance with their requirements, Ezemvelo KZN Wildlife enforces environmental legislation. This legislation is the Natal Parks Board Ordinance, 15 of 1974; Kwazulu Department of Nature Conservation Act, 29 of 1992 and National Environmental Management: Biodiversity Act, 10 of 2004. Ezemvelo KZN Wildlife is currently drawing up new legislation to replace this legislation because of the amalgamation of the Natal Parks Board and the Kwazulu Department of Nature Conservation in 1998. DWA enforces its own legislation, such as (but not limited to) the Water Act, 36 of 1998. The problems with the current legislation are the confusion between the roles of the various

government departments and a lack of recognition of the seriousness of environmental crimes. The confusion of roles is being exploited by illegal users of the dam. A wide range of sectors of society, from community members to the judiciary and other government departments do not recognise how serious environmental crimes are.

The main uses of the Pongola dam are currently ecotourism in the form of tiger fishing, boating, birding, game viewing from boats and game drives on land under private concessions and within protected areas managed by Ezemvelo KZN Wildlife. The dam is used for recreational purposes by the private lodges on the western shore of the dam, such as the newly built Jozini Tiger Lodge near the dam wall. The fish caught by recreational anglers are either consumed by the anglers or released. In the gorge area, there are informal subsistence fishers, who use hook and line fishing techniques, and *Sizabantu* artisanal gill netters who operate from the DWA slipway on a 'formalised' basis. The latter are formalised in the sense that they have fishing permits and skippers' licences but their fishing practices (i.e. use of gill nets) fall outside the ambit of the existing permit system. Fishing without permits (or poaching) is reportedly carried out on the eastern shore, which is bordered by protected areas managed by Ezemvelo KZN Wildlife. Poaching reportedly also takes place throughout the dam but most notably along the western shore bordered by private land and protected areas. *Sizabantu* artisanal fishers sell their catch to an organized group of local women (*Abathengi boFish*), who re-sell the fish in the town of Jozini and further afield.

The key issues and concerns around the current utilization, management and governance of Pongola Dam was mainly the illegal gill net fishing. Under current environmental legislation, Ezemvelo KZN Wildlife was responsible for law enforcement activities in respect of fishing on the dam. Ezemvelo's responsibilities included protection of the "threatened" tiger fish species and implementation of the agency's policy against gill netting. The Phongola Sustainable Use Plan (SUP) which was compiled for the dam but was not being implemented. The SUP was championed by DWA, who remained responsible for the management of the dam infrastructure as well as the "Admiralty Reserve" land adjacent to the dam. The plan did not make provision for gill netting and access to the water body itself from non-designated slipways and, as such, Ezemvelo considered local fishers' activities to be illegal.

The background to gill netting was that the practice began in the 1980s as part of a project by the Kwazulu Department of Nature Conservation (KDNC). Gill netting was temporarily permitted to determine whether or not the harvest method could be sustainable over the long term. A local fisher, Mr Ndlazi, was granted permission to net in the gorge area. Large catches and data were collected for some years, however with the amalgamation of the KDNC and the Natal Parks Board (NPB) the management and supervision of the operation became diluted. Mr Andre Honiball (the DWA official resident at the dam wall), supervised the gill netting operation in the early 1990s. Fishers were allowed access to the gorge via the DWAF slipway. Apparently DWAF took out a permit from Ezemvelo KZN Wildlife on behalf of the netters. Mr Ndlazi's permit expired on the 31st December 1998 and subsequently no legal freshwater netting permits had been issued in KZN. However it was noted that the gill netting activity had continued and become widespread on the dam. After the departure of Mr Honiball, no formal supervision had occurred. The netters had subsequently started operating outside the gorge, submerging nets so that they were undetected. They furthermore operated at night and in full moon for fear of being arrested (Hanekom, 2011). While the earlier experiment with gill netting had been intended for subsistence purposes, the sale of fish had become commercialized to such proportions that it was driving the practice of gill netting. In the respondent's view, both gill net fishing and fish selling activities were illegal. Furthermore, some of these practices were occurring on a second informal spillway, which had been constructed by Jozini Tiger Lodge without permission from DWA. The also respondent conceded that black gill net fishers were aggrieved about the inequitable sharing of economic benefits from the dam fisheries. Their grievance emanated from the fact that private land owners on the western shore had been allowed to develop dam access infrastructure at their own cost, offer recreational angling as an economic activity associated with their tourism lodges and thus generate wealth. By contrast, members of rural communities on the eastern shore did not own similar infrastructure or enjoy similar opportunities but struggled with unfulfilled basic needs, poverty and unemployment. They perceived financial inequities to be racial inequities.

By contrast, informal fishers in general had no permits. However, since the requirement for permits no longer applied illegal fishing could be defined as that which fell outside the ambit of existing laws. Nationally and in the case of Pongola Dam, this primarily included gill net fishing. Illegal fishing was taking place on both State and private land and included both gill netting and illegal traversing of restricted state and private land to access the dam fisheries. Informal subsistence fishers and artisanal gill netters chose to trespass rather than use formal gate entrances to protected areas, where permission to enter was granted upon payment of a fee. Often fishers would jump over or cut through fences to get to the dam. A major part of the problem was that members of local communities had no means to freely access the dam, other than via trespassing and using the DWA spillway and informal Jozini Tiger Lodge spillway. While EKZN and private land owners controlled access to much of the land surrounding the dam, access to the dam itself was under the jurisdiction of DWA.

According to the respondent, Ezemvelo KZN Wildlife was addressing the issues and concerns about the dam through a combination of education programmes and law enforcement activities. Both activities formed part of Ezemvelo's mandate, but the agency's efforts were allegedly hampered by agendas of other government departments, non-governmental organisations (NGOs) and private individuals who were acting independently. Despite these challenges, Ezemvelo KZN Wildlife had both dedicated law enforcement as well as community conservation staff who addressed these issues directly.

Based on studies in Pongola Dam, Lake St. Lucia and Kosi Bay, problems encountered were related to stock as well as management and by-catch issues, but the most important facet was that it was virtually impossible to maintain compliance with the conditions that were essential to ensure the sustainability of the catches. Conditions, such as control over effort and mesh size, could be drawn up but most were simply unenforceable. Allowing some netting in an area makes management more complicated and difficult, as each net the managers find has to be carefully inspected, in case it is illegal, instead of managers being able to pull out any nets. Illegal netters, if challenged, would often say that they had forgotten their permits and, if given time to produce a permit, would rapidly obtain one from a "legal" netter (Hanekom, 2011). The reasons why the various experimental netting programmes failed, included the following:

- **Non compliance with permit conditions**
  - Nets were set in wrong areas and times
  - Nets were longer than the permit conditions
  - Legal nets were not adequately marked
  - By-catch was almost never released or reported (crocodiles, crabs, birds & prawns)
- **Management made more difficult**
  - Management had to closely check all nets
  - Illegal netters submitted permits obtained from legal netters after being caught
  - People could walk around openly carrying nets
  - Recreational fish species were sold
  - "Legal" nets were stolen so net tags fell into the hands of illegal netters.
- **Inability to fairly distribute benefits**
  - Permits were often not ethically distributed within the communities
  - Permits were sold or hoarded by leaders
  - Really poor people were rarely awarded permits by committees

Therefore, the large fish resources of some state dams, such as Pongola dam, could be sustainably exploited but some form of carefully managed commercial operation, or fish farm, would appear to be a much better option, in practice, than issuing local people netting permits. Ezemvelo KZN Wildlife (EKZN) recommends that due to the limited nature of most fish stocks, the vulnerability of spawning and other aggregations and the value as a recreational fishery, no netting be allowed in the freshwater of Kwazulu Natal (Hanekom, 2011). This is conditional provided that traditional fishers on the Pongola floodplain are allowed to continue to use traditional methods to catch fish and anyone may fish by rod and line in open areas (Hanekom, 2011).

In a telephonic interview on 06 May 2011, EKZN respondent, explained that in June 2009, it was established that a community member had a boat and claimed that the WUA had granted him interim authority to fish in the gorge. He had five community members assisting him. In a subsequent interview in July 2009, it was established that a total of fourteen fishermen were active in the gorge. They operated with unregistered boats and with no valid permits. They were operating under assumption that they were permitted to continue netting until the legal permit issue was dealt with. They believed that they are permitted to fish in the gorge and the eastern shores, as they have complained that there are no fish in gorge. At various WUA meetings attend in the latter half of 2009, it was categorically stated by a committee member that gill netting is legal. The WUA chairman continuously challenged the claims that gill net fishing activities were illegal. At an Honorary Officer meeting on the 2nd of December 2009, it was confirmed by WUA members that gill netting on the main dam was illegal and should be restricted to the gorge until the permit process finalised. Furthermore, the respondent explained that DWA manage the official slipway at the dam wall. This is the only official access to the dam, and it is intended for management purposes and not for recreational and/or commercial purposes). However no control is exercised over access and legal boat compliance (Hanekom, 2011)

In an interview held on 06 September 2011[3], the researchers sought further clarification from EKZN regarding the issue of arresting and charging of gill net fishers. It was explained that the practice of arresting and charging all gill netters was largely associated with the past. Then, the Natal homeland jurisdiction used to assist the Natal Parks Board (NPB) by arresting and charging illegal gill net fishers. NPB was responsible for law enforcement around the dam. With the merger between NPB and DWAF after 1994, a decision was taken that gill netting was unsustainable on Pongola Dam and would not be allowed. However, there has been a struggle to clarify jurisdictions of the various authorities on the dam. In the meantime, there is a moratorium on the arresting of all fishers – including gill net fishers – who mostly use the official spillway. Also, no fishing permits are required. Nonetheless, 'volunteers' assist EKZN with the monitoring of any contraventions to prohibitions of gill net fishing throughout the dam. However, gill netters are not arrested by EKZN but by the volunteer private individuals.

3.6.3 Makhathini Research Station and Pongola Dam Cage Culture Experiment

The Aquaculture Division of Makhathini Research Station (KZN Department of Agriculture and Environmental Affairs) was initially established in 1989 with the aim to do research on indigenous fish species, that is, tilapia and catfish (Khanyile, 2011). The aim was to assist small-scale farmers with fingerlings and re-stock dams where fishing takes place. However, this was not sustainable because fishers harvested the fish stock just after dam restocking and regulations from the Nature Conservation/Ezemvelo KZN Wildlife office restricted movement of fish from one river system to another. There was also a problem with poor communication and education of local fishers. It is thus necessary for good management and training to be in place in order for aquaculture business to flourish. Since coordination is not the Department of Agriculture's line of function, they have had to wait until Nature Conservation educates the fishermen. The project stopped in 2004 because of policy regarding transportation of fish from one water system to another, in terms of the National Environmental Management Act (NEMA) No. 107 of 1998. Nature conservation is more concerned with genetics than food security, the latter of which is what the Department of Agriculture Forestry and Fisheries (DAFF) values. At national level, fisheries fall under agriculture, whilst at provincial level, they fall under nature conservation. If the role became a line of function of provincial departments of agriculture, then these departments could educate the fishermen and implement their values.

According to the respondent, the DAEA had investigated the development of a fish farm on the Makatini flats, with a reported intention of raising Tilapia fingerlings for release in the dam to supplement the fishing operations. The business plan suggested the formation of a cooperative, with a levy paid to hatchery on fish caught. The intention was to replace gill netting and promote a more sustainable harvest. An aquaculture pilot project in floating cages at the dam wall conducted by Stellenbosch University however did not yield acceptable growth performance and the project was discontinued.

[3] Telephonic interview by Barbara Tapela, 06 September 2011.

Figure 2 Aquaculture project, Makhathini Research Station

This project was funded by the Water Research Commission (WRC). Figure 2 shows the place where fish from the aquaculture project are kept. The fish were being fed different types of food. The fish produced by the aquaculture project are given to surrounding communities, farm workers or sold at minimal departmental tariffs. The research findings are published and presented at farmers' days through symposiums by the extension officers.

The Makhathini Research Station official reported that problems that the department faces are lack of skills, funding, aquaculture water policy, scarcity of projects and the fact that if there is no policy allowing fish transfer, there will be no funding. Ornamental or aquarium fish farmers do not face this problem. Skills are not equally distributed across the Kwazulu Natal Province and there are no fishery extension officers. There need to be workshops for policy verification. Nature Conservation had been arresting local people for illegal fishing. However, suggested that when new policy is being formulated there is a need to recognise the role of *indunas* in organizing fishing practices (Khanyile, 2011).

3.6.4 South African Fishery and Aquaculture Development CC

The key respondent representing South African Fishery and Aquaculture Development CC (SAFAAD), who has been assisting a group of fifteen (15) subsistence fishers affiliated to 'Sizabantu' on Pongola Dam to manage their activity sustainably (Kilroe, 2011) According to the respondent, these fishers have all passed their skippers' licenses and have participated in life skills workshops, with benefit from foreign donor funding. They are envisaged to attend a course in Aquaculture/Fisheries management. SAFAAD is in the process of establishing a Trust structure through which the fishers will conduct their business and raise funds for the upgrade of their equipment.

The SAFAAD respondent further stated that the fishers have, unfortunately, been subject to periodic attacks from one of the lodge owners, who seem intent on removing them from the dam. Making use of Pongola-based EKZN Wildlife volunteers and the police, these have had the fisher's boats and nets confiscated. As a result the fishers and the women who sell the fish were unable to earn a livelihood. All these activities were recorded on the lodge owner's website, with a claim that they were in control of the situation, rather than the (legally responsible) Recreational Water User's Association or EKZN Wildlife. Ultimately in 2010 and 2011, the lodge owners brought criminal charges against artisanal fishers but these were dismissed by the court. The court also showed that the claim by a lodge owner's son that he was an EKZN Wildlife volunteer was out of order. The artisanal fishers' winning of the case was largely due to SAFAAD's support, and the legal advice SAFAAD obtained from the Legal Resources Centre and Legal Aid in these matters.

In a letter to the KZN MEC for Agriculture & Environmental Affairs, SAFAAD expressed a concern that if the situation was not being dealt with by the department as a matter of urgency, Sizabantu fishers would be crowded out and permanently removed from the dam (Kilroe, 2011). SAFAAD also pointed out that the national Department of Agriculture Forestry and Fisheries' (DAFF's) mandate now included inland fisheries. Furthermore, Kilroe asserted that KZN and other provincial governments would clearly need to incorporate fishery development skills within their Agriculture Departments. He also noted that the matter was being addressed, to some degree, by DWA, which establishes Water User Associations (WUA) to "right the wrongs of the past and give all users a seat at the rights allocation table".

Kilroe's proposed operating structure was that all policy decisions on the use of the dam should henceforth be made by the WUA, with EKZN Wildlife acting as a service provider to enforce that policy. Kilroe also raised awareness that local people had fished the Pongola River for hundreds of years before it was dammed. Whilst

the WUA had been awaiting seed money from the Department of Water Affairs, in order to start fully conducting its activities, there had been a vacuum in its new policy development. In the meantime EKZN Wildlife said it stood by its rule that gill-netting would not be permitted in KZN. In Kilroe's view, this was an obvious policy for an organization that had a conservation role but, not to its credit, disadvantaged the local fishers.

SAFAAD's stance was therefore that what was required, to ensure sustainability, was a fishery development management plan that included an ongoing stock assessment of the fish, zoning of the dam, a policy on the alternative users, equipment and resultant licensing. This could easily be done by a research group, such as Rhodes University's Ichthyology and Fisheries Science Department. Such intervention would also represent a demonstration pilot programme for the rest of KZN, which had the highest potential for inland fishery development in South Africa. Kilroe surmised that the biggest problem faced was people's attitudes, largely carried over from South Africa's divisive past. Hence the MEC's intervention was critical to resolving the case of social and economic justice.

3.6.5 Roles of Traditional Leadership in Phongola Floodplain

In the Pongola floodplain, the main institutional stakeholders were the traditional leaders (*amakhosi and izinduna*). One induna said that fishing without licences was illegal because of the deaths from drowning that had taken place. The prohibition applied both to artisanal and subsistence fishing using rods and nets. There were no known measures that had been put in place to ensure the fishers' safety even if they paid the licence fee. In some communities there was lack of clarity on who should receive the fee and what it was to be used for, while in others traditional leaders collected the fees. The problem was linked to an institutional gap whereby the old practice of traditional leaders collecting fees had effectively become obsolete without newer alternative arrangements to replace it. Ezemvelo KZN Wildlife, however, was said to have recommended that traditional subsistence fishing should be allowed to continue in the pans but not gill net fishing practices.

3.7 Rapid Appraisals of Fishers and Local Key Respondents

The major findings from rapid appraisals were obtained from the fishers in the Pongola dam and floodplain as well as fish sellers in Jozini. All the fishers in the dam were men, whilst in the floodplain there were some women who fished using the *imfonya* baskets.

3.7.1 Pongola Dam: Focus Group with Sizabantu Fishermen

Sizabantu Fishers' Association had a membership of 15 male artisanal fishers. According to the respondents, none of the rural women fished in the Pongola Dam. The association began in 2005, although the older among the fishermen had been fishing for at least 15 years. The fishers had two boats (see Figure 3 for example) and used sizes 5 and 6 nets. The fishers had made the boats themselves after the ones that they had bought were confiscated by "the whites" (i.e. referring to the owner, managers and tourists from Nkwazi lodge). The fishermen did not practise any indigenous fishing methods but knew of the use of *imfonya*, which was used in the floodplain, but used gill nets and hand lines. They learnt about fishing from their community and parents, whilst staying close to the sea and through practising in the lakes. They fished for both subsistence and commercial purposes. The species caught were *Oreochromis mossambicus* and catfish. They purchased the nets from

Figure 3 Pongola Dam: Fishermen removing fish from nets

Mozambique for between R300 and R1200. The fishers went fishing three times a week when it was not windy. They laid the nets in the evening to avoid being disturbed by the whites. In the past, when there were no threats of arrest, the fishers would lay the nets in the morning. The nets lay in the water for 24 hours and were pulled early in the morning. The fishermen fished throughout the year. They ate and sold the fish to a group of women, *Abathengi boFish*, who came to the slipway to buy every morning. The artisanal fishers' income was mainly from fishing. On average, the fishermen each made between R500 and R3000 a week. The fish were sold for between R5 (palm span size) and R20 (two palms). None of the fishermen disclosed their total household income, however. Although they were not actively job seeking, they said they would like to have job security. Before they started artisanal fishing, the fishers had been unemployed or had been retrenched. Some had relied on child support grants and/or informal self-employment while others had no sources of income.

The fishers' concerns were as follows:

- The disappearance of nets after fishers had set them in the water. They believed that the nets were being taken by the "white men";
- The confiscation artisanal fishers' boats that were the good and safe;
- The disappearance of people in the dam. Two people disappeared in 2008. One was discovered after a week whilst the other was never found.
- How to get immediate assistance from in cases of emergency, such as drowning. This concern was related to incidents in which fishers disappeared in the dam, which were reported to the authorities but nothing was done and no one was held responsible for the lack of attention to the situation;
- The risk of being confronted by big animals such as hippos;
- The arrest of black artisanal fishers by "white men";
- Where to throw the rubbish after gutting and removing scales. There was a bin on the bank next to the slipway, however, but this was apparently inadequate; and
- Over-fishing.

The members of Sizabantu Fishers' Association had no concerns about outsiders fishing.

Artisanal fishing on Pongola Dam is therefore organised because the fishermen have boating groups, skippers' licences, fishing permits and rules, such as using only size 5 or 6 nets because these allow the small fish to go through. Each boat is manned by three people (see Figure 4 for boat examples). The chairperson of Sizabantu fishing committee is King Mthombela. The fishermen have meetings but there is no cash contribution or making of rules, unless there is a need. The fishers consider the WUA and all other stakeholders to be collectively responsible for managing the fisheries resources. Concerns are mainly about personal safety and livelihood vulnerability to harassment by law enforcement agents, who take the fishermen's boats and nets thus compelling fishers to use unsafe home-made boats and unregulated nets. Artisanal fishers had no problems with outsiders fishing but felt that it was unfair for their tools to be confiscated and the arrests because the dam belonged to the community. Their other concern was that when they harvested a lot of fish, they had nowhere to store it.

Figure 4 Boats used by Sizabantu fishers

3.7.2 Jozini Fish Sellers

A focus group discussion was held with a few of the women fish sellers aged between 30 and 49 years, who bought fish from Sizabantu fishers. All were unemployed and wished that they could find secure jobs. A female respondent stated she sold *njemani* (fruit alcohol) before she sold fish. She stopped selling the alcohol because of problems with the police and the fish selling seemed like a lucrative business. A second female respondent worked at Mkuze cane fields but left because she had a problem with her arm and could not *hlakula* (i.e. cultivate crops) anymore. A third female respondent worked at a store in Empangeni but stopped after she was involved in a car accident. She sold vegetables and stopped because she could not manage to go to the fields to pick up fruit anymore. A fouth female fish seller respondent worked at a hotel in Hluhluwe, so when the contract ended, she left. A fifth female fish seller respondent had never worked. She used to fry fish in a shop but later felt that she could do better if she was self-employed.

Figure 5 Woman fish sellers with buckets of fish purchased from Sizabantu fishers

None of the women fished because they did not know how to. They bought the fish from Sizabantu fishers, whom they met at the slipway early in the mornings 5). They would phone the fishermen to find out whether they had gone fishing and when they were going to haul in the catch. The women bought the fish for between R5 and R20. They complained that the price had gone up last year for the big fish from R15 to R20 and that the R5 one was now R7. The women sold the fish for prices ranging between R25 and R30. The fish were sold to the community by walking around the town as well as selling from the bottle store. Bream and catfish were the type of fish that the women sold. The women said that although they did not earn much from selling fish, they had no alternative. Both outsiders and locals bought fish. Whites occasionally bought fish when passing through the town. No white women fished in Jozini. The fish sellers did not encounter any problems with law enforcement agents regarding the sale of fish. The women were concerned about the supply of fish due to changes in timetable as a result of the confiscation of nets, arrest and harassment of fishermen. They complained that the fish were now expensive and that they were not making much a profit anymore. When the fish are not bought, they cannot do anything with the fish because none of the women owned refrigerators. They mainly ate the fish when there was some left over. The women did not sell to shops. They buy all of the fish that the fishermen catch but said that if any of the fish remained, the fishermen themselves would go to sell it in the community. People from Mtubatuba, Ndumo and Pongolo also bought fish from Jozini.

3.7.3 Pongola Floodplain Fishers

Subsistence fishers in the Pongola Floodplain included both adult women and men. The fish species caught were bream, catfish and 'sardines'. Any tiger fish caught were thrown back into the water. The *imfonya* indigenous fishing technique was used in the drier areas with shallow, muddy water, mainly by women. Male fishers used techniques such as spears, (*induku*), hook and line and nets.

Some of the male fishers claimed to have stopped using nets because of the law that prohibits the use of nets and the high risk of drowning. After one incident of drowning, fishermen had been told to only fish when given authority (licences). Indunas had told them about the licences. Licence fees were paid to the indunas and the amounts varied from one community to another, with the maximum being R1000. In communities subject to high licence fees, fishers were not happy with the arrangement and some had begun to fish at different places, far from the indunas' sight. They would put nets out at around 5pm in the afternoon then remove them the following day at 6am. Many fishers fished twice or thrice per week when there was need for food. Some fished around midday after attending to their fields. While some fished solely for subsistence, others sold their surplus catch. Prices varied. Some fishers sold bream at R5 for fish the size of his palm or R10 for the bigger fish, and the price had recently increased to R10 for both sizes of fish. Others sold 3 bream for R10 and

large catfish for R30. There were no formal structures that made rules about fish prices, fishing techniques and practices. The indunas were responsible for managing the land and natural resources the floodplain as a whole but were not involved in the day-to-day aspects of fishing. Due to their vulnerability to risks such as water borne diseases, drowning, injury and attacks by snakes and hippos, fishers were concerned about their personal security and safety. They were also concerned about dam water releases. Fishers in some of the rural communities were sometimes not informed about plans to release water and put them in a very vulnerable position. In other cases, the water supplied through dam releases was too low, such that the pans tended to dry out. This had negative effects on both fishers and gardeners. The affected fishers stated that water supply needed to be increased to prevent the pans from drying out. Currently, fishing in pans was not something that could be totally relied on because sometimes, such as in winter, catch sizes could be very low.

3.7.4 Imfonya Fishers

Female fishers used *imfonya* and *ikhukhula* fishing techniques. *Imfonya* is a basket that is placed in water and when a fisher feels or hears movement inside the basket, they put their hand through the hole on the top and catch the fish. The baskets are sold by weavers for R50 for the large size and R25 for the small sized ones. The women did not own any *imfonya* but used borrowed ones whenever they went fishing. The women had been fishing since they were about 8 years old. Another technique they used was *ikhukhula*, which is a sheet of shade cloth with very small holes. This is also known as shade net fishing and commonly occurs below dam walls and in pools of seasonal rivers. The net is placed in the water and lifted up when the fish swim in the water above where the sheet has been placed. Both men and women fished in the pans but women mainly used *imfonya*.

The women caught fish for subsistence. The species caught were *Oreochromis mossambicus*, sardines and tiger fish. The women caught the fish in the afternoon after having completed their household chores. This was usually twice a week in summer/autumn. They did not fish in winter because the fish were difficult to catch then. They ate the fish fresh and did not sell any. When asked if fishing was organised the women they said that it was not and that no ritual was performed for closing the fishing season, the community just knew that when the water level decreased, it was time to stop fishing. Their tradition was that people with a certain surname (which was Gumede in their area), would open the fishing season of *ukufonya* and let people know that the season was open. It was very rare that people would not know that the season had been opened. The women had no concerns about personal safety and security because fishing was a tradition that they were used to. Their only fear was catching a snake and getting hurt by fish scales and fins. They also had no concerns about outsiders fishing or over-fishing. Some of the women wished that there could be resource centres in their villages so that people could get skills and jobs.

3.8 Discussion and Conclusion

In summary, key issues emerging from research are as follows:

1. The fundamental problem for Pongola Dam fisheries is an underlying governance issue. While attempts have been made to ensure ‘good governance’ through principles such as participation, equity, transparency and accountability, evidence suggests black artisanal fishers in Pongola Dam feel marginalized and access to the benefits of recreational tourism fishing is inequitable. These primary stakeholders feel discriminated against as “blacks” because they get arrested and their gear confiscated by “white” lodge operators, recreational anglers and tourists, with Ezemvelo’s collusion. Central to the exclusion of artisanal fishers has been the ‘recreational’ category of the WUA, which has effectively been used to preclude other fishery users.
2. With regard to the Sustainable Use Plan (SUP) for the dam, while the plan objectives include equity, particularly in terms of black economic empowerment (BEE), in reality the plan is “conservation” orientated and does not allow for the inclusion of livelihoods use rights. Furthermore, given that the local communities are poor, the plan does not include any provisions towards redressing historical injustices and achieving equity and social integration. Outstanding equity issues can be captured in the following questions: How were the fishing charter rights allocated? How does rights allocation benefit local disadvantaged people? Is the fishing rights allocation framework BEE compliant, as required by the SUP?

3 While the WUA exists under the authority of the DWA, this stakeholder structure has not been sufficiently capacitated to manage its mandate. Furthermore, the distinction between the roles and responsibilities of the WUA and EKZN in fisheries management is not clear, which results in confusion regarding whether or not to allow gill netting in the gorge.
4 Given the past failures by aquaculture attempts, it is reasonable to surmise that aquaculture may not an option for solving the fisher livelihood issues. Rather, it seems likely artisanal levels of inland fishing might be tenable. A study on the stocking and harvesting levels for this dam is urgently required.
5 The current institutional *status quo* does not seem to offer a viable option for resolving challenges pertaining to co-management of the Pongola dam fishery. EKZN's education and outreach programme assumes that there is widespread acceptance of the current access and management policies, while in reality HDI groups broadly perceive these to be inequitable, racially-biased and silent on unresolved social issues, particularly the criminalization of subsistence fishing by members of displaced and impoverished communities.
6 The main objections to gill netting by EKZN are management control problems, since the institution lacks sufficient capacity. Therefore a reformist developmental intervention is required to assist the fishers and manage the fishery.

It is interesting to note that the fishers in Pongola Dam formed a committee and that their fishing activities were well organised. However, the fishers in the dam still faced threats of arrest as Ezemvelo and tourism operators considered their fishing activities to be illegal. By contrast, the fishers believed that their fishing practices and techniques were legal, because they used large-holed nets even though they did not have permits, as well as legitimate. The fishers said that they were willing to comply with the laws if they could be allowed to fish and given the set of rules which they had to follow. However, the rules under which Ezemvelo KZN Wildlife operates do not allow gill net fishing which is the survival method of the fishers. Hence, the fishers would likely not agree to using shorter nets and catching smaller numbers of fish. The fact that Sizabantu fishermen are organised has helped them plan their activities and pool resources, and this presents a possible opportunity for the development of effective co-management and sustainable use arrangements for Pongolo Dam fishery.

In order for Ezemvelo KZN Wildlife's educational programmes to be effective, the organisation needs to clear up the tension between themselves and subsistence and artisanal fishers. All the stakeholders would have to come up with a plan for fishing activities in the dam that would be beneficial to all stakeholders without compromising the fish population. However, there would need to be discussions between the fishers, Ezemvelo KZN Wildlife, DWA and DAFF in order to develop policy on inland fisheries, coordinate activities and set a clear line of communication. This would help the fishers as well as sellers openly carry out their activities and enable monitoring of the resource. Education programmes run by Ezemvelo KZN Wildlife would also be easier to implement because the fishers would not have to give up their main source of income. Safety measures could also be put into place to avoid loss of life from drowning of fishers in both the dam and the floodplain.

3.9 References and Bibliography

Hanekom, C. 2010. Ms Catherine Hanekom, Ezemvelo KZN Wildlife, personal communication, March 2011.
Khanyile, M 2011. Researcher, Makathini Research Station, personal communication, April 2011.

Kilroe, K. 2011. South African Fishery and Aquaculture Development Cc, letter to the KZN MEC for Agriculture & Environmental Affairs, 16th November 2010

Jozini Local Municipality, Draft IDP Review, March 2010.

PRESPA Project Briefs. 2009. *Pongola River Ecosystem Services for Poverty Alleviation: Project briefs December 2009*. E-publication (***www.uea.ac.uk***).

Van Vuuren, L. 2009. Pongolapoort Dam: Development steeped in controversy. *Water Wheel,* 8 (3), 23-27.

South African Fishery and Aquaculture Development cc. 2010. 'Your support for social and economic justice for the Sizabantu subsistence fishers on Pongola Dam'. Letter to KZN MEC (Ms Lydia Johnson) by Mr Patrick Kilroe, 26 November.

www.dwaf.gov.za/iwqs/rhp/state_of_rivers/state_of_letluv_01/letaba.html (18 April 2011).

www.jozini.org.za (Accessed 18 April 2011).

4 VOËLVLEI DAM, WESTERN CAPE

Figure 6 Voëvlei Dam

4.1 Introduction

Members of the WRC Reference Group suggested inclusion of this case study at an intermediate project meeting held at Grahamstown on 12 April 2011. Fieldwork was undertaken on the 10th and 11th of May 2011 by Barbara Tapela and Vimbai Rachel Jenjezwa. The researchers further requested a meeting to be convened with all key stakeholders, including members of the Voëlvlei Management Committee (VMC). A Stakeholder Consultation meeting was therefore held on 18 June at Voëlvlei Dam.

Prior to field research, researchers communicated with the VMC member based at Silwerfontein Guest Farm to explain the background and purpose of the study and to obtain assistance in identifying and contacting all other key institutional stakeholders.

4.2 Methodology

Firstly, background information to Voëlvlei Dam and fishery was collected through a rapid desktop survey of selected secondary data sources. Aspects of Stakeholder Analysis methodology were then used to identify, characterize and contact key stakeholders. Following this, researchers proceeded to engage with stakeholders, individually and collectively, through interviews and meetings. Stakeholder engagement was largely restricted to formal institutions and organizations, including government departments, recreational clubs and private investors. One challenge was that efforts to engage with representatives of the local municipal, City of Cape Town's Water Treatment Works and the Water User Association were not successful. Further efforts will be made to engage with these stakeholders. Another problem encountered was the unavailability of key local community members and elected representatives, who could have supplied valuable information. No unorganized fishers were interviewed. This was largely due to the need to avoid

engagements that might inadvertently raise expectations among unorganized historically disadvantaged individuals (HDIs) and groups. Nonetheless, researchers obtained secondary information from key resource persons from outside local communities, who were aware of local community interests, issues and dynamics pertaining to Voëlvlei Dam fishery access and use. Proxy data of fishing activities of unorganized fishers was also obtained from records kept by some of the stakeholders interviewed as well as research reports at Tulbagh Library.

4.3 Background to the Study Area

4.3.1 Location

The Voëlvlei dam is located in the Drakenstein Local Municipality of the Western Cape Province. The dam lies east of the R44/R46 (Ceres road) that links Hermon and Gouda. The dam is located about 6 kilometres south of Gouda which is the closest town. Other towns close to the dam are Tulbagh, Saron and Hermon. Drakenstein Local Municipality has one of the most productive agricultural belts in the Western Cape, as it is in the heart of South Africa's Winelands (i.e. area where there are numerous wine farms)[4].

4.3.2 Socioeconomic Profile

Drakenstein Local Municipality has a population of just over 200 000 with an annual population increase of 4 200. Paarl and Wellington are the most densely populated areas. The three small towns of Hermon, Gouda and Saron, have an approximate population of between 8 500 and 10 000 (Drakenstein Municipality IDP 2011/2012). Apart from Gouda a small urban settlement close to the dam is Sonkwadrift.

The population comprises of coloureds, Africans, Indians and whites. According to the 2001 Census statistics, 64% of the population was coloured, 21% African and 15% white. Africans now represent the second largest population group in the Municipal Area. Since 1996, the coloured population (as a percentage of the total population) decreased by 7%, whites decreased by 2% and Africans increased by 5%. More than half of the population (55,5%) is under the age of 30 with a gender split of 49.1% males and 50,9% females in the total population. Illiteracy (over 14 yrs with less than Grade 7) stands at 23%. A total of 44% of the labour force is employed in low skill categories, and 39% is in skilled occupancies, with approximately 19% in highly skilled occupancies (Drakenstein Municipality IDP 2011/2012)[5].

Unemployment and poverty affects a large number of people. An estimated 23% of residents are unemployed. The monthly wages for unskilled employees is estimated at between R1 400 to R4 200. The largest economic sector is finance and business services (25.6%). This is followed by the manufacturing sector which is the second biggest employer (22,9%), but has been in decline since 1998 with job losses in especially the clothing and textile industry. The economic sectors that employ most citizens in Drakenstein Municipality are the agricultural, manufacturing, trade, finance and government service sectors. Agriculture is the third biggest sector (14, 9%) and Drakenstein is the service centre within the wine and fruit belt. Agriculture is the biggest employer (29%), but much of this employment is seasonal.

4.4 History and Management of the Inland Fishery

The Voëlvei Dam is dam number G100-03 according to the Department of Water Affairs (DWA). The dam occurs on the Vogelvlei watercourse and is owned by DWA. The dam was built for municipal and industrial use.

The Voëlvlei Dam was commissioned in 1952 and was the first large water supply scheme in the Berg River catchment. The dam was initially a marsh. It was constructed by impounding the natural Vogelvlei Lake near Gouda. As the catchment of the lake was only 31 square kilometres, additional water was obtained via a canal from the Kleinberg River. The dam supplied water to Riebeek-Kasteel, Riebeek-Wes, Malmesbury, Darling, Mooreesburg and farms along the supply route. Water was released into the Berg River for riparian farmers downstream of Zonkwasdrif and for abstraction at Misverstand Dam. In 1969, Cape Town's

[4] Source: ***http://www.drakenstein. gov.za/Tourism/Gouda/Pages/GoudaHome.aspx***
[5] Source: ***http://www.drakenstein.gov.za/Residents/demographics/Pages/Demographics.aspx.***

increasing water demand resulted in the dam wall being raised and more water being abstracted from the Klein Berg River. In 1971, supply to Cape Town was increased to 1.8 million cubic metres per day by constructing an additional canal to divert water from the Vier-en-Twintig and Leeu Rivers[6].

There is a submerged island near the pump station (water filtration plant) on the southern shoreline. The dam periphery is divided into three ecological zones. One is the area on the western side of the dam. In this area, there are a number of recreational clubs, such as the Voëlvlei Yacht Club. The dam is popular with water sport enthusiasts. Fishermen are attracted to the dam, which is mainly populated by small mouth bass, but which has been impacted by recent invasion of catfish. The stretch of water is roughly 8 kilometres long by 1,5 kilometres wide[7]. This land area surrounding the Voëlvlei Dam has controlled access and is inhabited by the geometric tortoise. The second zone is owned and managed by private farmers. The third zone is part of the nature reserve controlled by *CapeNature*. According to a November 2010 report, in recent years the water quality of the dam has changed from clear water to turbid. There are plans to pump surplus winter water from the Berg River into the dam (Draft Project Summary Document, 2010).

4.5 Characterization of Indigenous Knowledge and Current Fishing Practices and Techniques

4.5.1 Findings From Key Stakeholder Organisations

Interviews and consultations were held with institutional representatives of various government departments and organizations. Such interviews and consultations helped the researchers to obtain more detailed information about plans for the dam, fishing practices and conservation issues.

Department of Water Affairs (DWA)

The Voëlvlei Dam is a pan that was built on a river bed. It is one of the dams with the best quality of water in the country because 24 largely pristine rivers flow into it. One of the pipelines that drain into the dam is from Ceres. DWA hires Western Cape Water Consultants to do feasibility studies on the area. One such study is the "Pre-feasibility and feasibility studies for augmentation of the Western Cape Water supply system by means of further surface water development". Findings by this study are that the volume of water is not enough to supply all the towns hence the plans to source additional water from the Berg River (Barnes, 2011).

The DWA respondent also reported that the private road to the dam is a shared access between Silwerfontein Guest Farm and DWA. DWA and Silwerfontein Guest Farm maintain the road in alternative years. Barnes stated that the National Resource Water Infrastructure Southern Cluster is divided into water management areas. Bass was abundant but because of water from Kleinberg which brought in carp and catfish, the latter species has become the dominant one. DWA does sampling on a weekly basis (every Thursday). Sometimes DWA encounters hyacinth and parrots foot which are alien species and are dealt with by Working for Water. They have never had a problem with water quality. They distribute water fairly with minimal losses (Barnes, 2011).

The DWA respondent further said that the dam is open from 6am to 6pm, and access to the dam is for free, if visitors use the DWA entrance. The DWA's core business is water. They can only make land available on Saturday. There is need for intervention from municipalities and the Department of Environment and Development Planning to put up infrastructure and make a plan. DWA has a problem with Silwerfontein Guest Farm because the staff charges people for access to the dam through their gate. Certain areas of the dam are allocated to fishing, some pseople who get access to the dam are informal fishers, who pay R40 to Silwerfontein Guest Farm's staff for access. The angling club keeps people out by having a maximum of 100 members at a time. Interested people get on a list and are 'provisional' members for the first year or two then the club's owners finally decide on the membership status. If you become a member of the angling club, you pay R100 per year and get keys to the padlock at the gate. The angling clubs let fishers make use of their amenities but do not allow people into the dam area (Barnes, 2011).

[6] Source: ***http://www.dwa.gov.za/iwqs/rhp/state_of_rivers/berg04/berg3.pdf***

[7] Sources: ***http://www.drakenstein.gov.za/Tourism/Gouda/ Pages/GoudaHome.aspx; http://www.bigbass.0catch.com/id5A7.12.htm***

According to the respondent, stakeholders, principally Tulbagh Local Municipality and interested members of settlements such as Gouda and others beyond, are looking at developing a recreational area around the dam. However, although all stakeholders were once invited to a meeting on the issue, elected municipal councillors did not attend. This has constrained stakeholder engagement on finding a possible way forward. The respondent's wife, who frequently interacts with members of local communities, such as Gouda and Sonkwasdrift, said that unemployment was high and local people needed to use the dam as a resource to benefit the community, especially for women's empowerment. She explained that most women work on farms picking fruit and earn R120 a week but the payment depends on the number of fruit picked and boxes packed. On average, 23 out of 25 households in Sonkwasdrift are unemployed. She concluded that people are looking for jobs but there are no employment opportunities.

DWA considers Voëlvlei Dam to be public infrastructure, whose access has largely been restricted to historically privileged members of angling and yachting clubs, and therefore support to interests of broadening stakeholder participation in benefit streams deriving from the dam should be explored (Barnes, 2011). He has proposed the development of a cultural village (Rhenoster River Cultural Village) whereby different cultures would offer training to visitors and local people on making and selling beads and beadwork, and teach local people skills to set up businesses for themselves and become self-sustainable. Members of such a project would also plant food for their own consumption and for sale to visitors. The plan also includes the project having 20 head of cattle and a bull, for milk and meat, and irrigation farming. The respondent showed researchers a draft plan for the project. He further explained that members of local communities would be given land ownership close to Voëlvlei Dam and the project would help alleviate poverty and unemployment.

Most people around the dam are unemployed and depend on state grants, hence the dam provides an economic and/or income generating potential. Of particular interest in this regard has been the targeting of invasive species, such as catfish and carp. The catfish, in particular, has export potential and can survive without water for long. Economic benefits from reducing overpopulation by such fish are complemented by ecosystem benefits, in terms of both species biodiversity and habitat and water quality. High carp populations, specifically, have been observed to create muddy conditions and cloudy water. With regard to broadening benefit sharing, there is an agreement to give extra fish to communities after angling competitions and when excess fish are caught. However, a problem is that the extra fish are often sold for between R5 and R20, which places fresh fish consumption beyond the means of many of the poorest of local households.

Cape Nature

The two main issues surrounding the Voëlvlei dam were the opening of access to the dam for fishing, and the sustainability of a commercial fishery (Lewis, 2011). There are concerns about responsibility for public access. The public area is close to the water treatment site and there are concerns about security, noise, management and regulations. There was public access close to the dam but because of fires being made and littering, this access to the dam was closed. Lewis' view was that it would be good if the dam was made accessible for organised groups such as schools but the visits needs to be coordinated and guided. There is no manpower to monitor fishing and cover large areas. The ideal situation would be to have a community conservation officer. His idea was for community involvement through creating "friends of water". People could take out school groups to the dam. DWA stopped bringing in school groups for tours for water education. There is need for a study on what anglers do with the fish they catch. If the fishers catch, they give the community for free and distribute the fish via social networks. There has been interest in a trial to introduce indigenous fish but the dam is infested with carp and catfish. It would help if the municipality were involved. They are trying to clean the water and start within the mountains before the river channel. This would be implemented by clearing alien species in farms upstream which surround the river that supplies the channels/canal to Voëlvlei dam (Lewis, 2011).

Western Cape Provincial Department of Agriculture

Views of the Western Cape Department of Agriculture were sought after a Stakeholder Consultation meeting that was held on 18 June at Voëlvlei Dam (Endemann, 2011) The follow-up interview specifically sought to obtain further details about a proposal for commercial fishing on Voëlvlei Dam. The proposal is for a pilot

commercial fishing experiment to be conducted in Voëlvlei Dam in order to assess the feasibility of such type of enterprise. The proposed project is intended to run for 10 to 12 months, looking at the volume of fish caught using long lines, fishing rods and lines, hand lines and beach seine nets. No gill net fishing will be allowed. An important pre-condition will therefore be the compulsory requirement for all participating fishers to regularly submit records of their catch.

Key issues to be addressed by the pilot project revolve around the following questions: i) How productive is the fishery? ii) How viable is a commercial fishing enterprise, in terms of demand by the expatriate market, distance to markets and other economic factors? How can small commercial fishers be linked to the market?

Department of Agriculture questions on economic and ecological viability need to be addressed to justify public fiscal expenditure, characterize the types of communities that buy fresh fish and ensure that the environmental integrity and water quality of Voëlvlei Dam is sustained (Endemann, 2011). From an economic viability perspective, the questions need to be viewed against the backdrop of risks associated with the capital intensive development of commercial fishing enterprises, high costs associated with transportation of produce over long distances to markets and the high transactional costs related to the utilization of spot markets, such as road sides and intersections, which small commercially-orientated fishers elsewhere in South Africa are observed to rely upon. Questions on viability also necessarily have to be seen in light of the prevailing , socio-economic and social-political complexities associated with initiating a pilot commercial fishing enterprise in Voëlvlei Dam. Endemann surmises that while the ecological and economic questions are important, it is the social questions that will prove to be the greatest challenge to the proposed pilot project.

Firstly, preliminary insights indicate that aspects of the observed black population show that the commercial supply of freshwater fish needs to be tied to the supply of a variety of other foods that are eaten with the fish, as part of the social cultures of some of the migrants. Such foods include yam, cassava and palm oil, among others. Effectively, the proposal considers that there will possibly be a need to address the economic viability question in broader terms than the fishing enterprise *per se*. Secondary questions will therefore include: i) How viable will be a comprehensive approach that relies on imports of foods that are not produced in South Africa? What possibilities exist to identify existing or develop new domestic sources of such foods?

Secondly, socio-economic contexts around Voëlvlei Dam are characterized by relatively high levels of poverty and unemployment among black people in small 'dorps' or urban settlements, such as Gouda and Sonkwasdrift, which service surrounding rural areas. Given the historical and prevailing inequalities in access to Voëlvlei Dam fishery, an imperative will therefore be to ensure that members of historically disadvantaged individuals (HDIs) living in such localities are among the active participants of the pilot project. Such an approach will require an integrated and coordinated approach that involves key stakeholders in socio-economic development, such as municipalities. A practical challenge, however, is that towns like Gouda and Sonkwasdrift are not among the 15 prioritized development nodes of the Western Cape, which makes it difficult for municipalities to mobilize the requisite funding for a comprehensive approach to developing inland fisheries to contribute towards rural livelihoods. Another challenge is that the proposal team will have to find ways, within the pilot project, to balance the interests of established large commercial enterprise operators, some of who operate on 30 to 40 other dams in the Western Cape, already supply 45 to 50 shops in the province and have applied for permission to gain access to Voëlvlei Dam fishery, with the interests of smaller commercial fishers, who reside locally and are envisaged to become the new entrants in the commercial inland fishing sector.

Thirdly, the most difficult of the social challenges (or "minefield") relates to sociopolitical factors. These include both the envisaged jostling for access to perceived economic benefits and the antecedent party politics and other political contestations, particularly in Gouda. According to the respondent, the envisaged challenge is for the provincial Department of Agriculture, Cape Nature and DWA to find effective mechanisms of ensuring that rights of access during the pilot phase are allocated in a transparent and

fair manner that foregrounds all the objectives of the experiment. Among these objectives is the question how to link small commercial fishers to the market. The respondent considers that the proposal will need to clearly specify the principles of allocation of access rights in the pilot project, so as to ensure the most suitable participants are included rather than the most powerful, influential or politically-connected among local HDIs.

In addition to principles and criteria for the selection of individual fishers, fisher groups and/or fishing enterprises, the proposal envisages that the three key governmental stakeholders will provide appropriate institutional arrangements to undergird commercial fishing rights allocation by the pilot project. Possibilities being explored are that DWA will provide the required 'water access rights', Cape Nature will issue fishing permits and the Western Cape Department of Agriculture will ensure compliance with agreed operational frameworks. Actors from these three organisations are scheduled to meet towards the end of September 2011, when they will discuss the draft proposal and way forward.

4.5.2 Findings from Rapid Appraisals of Fishers and Local Key Respondents

A member of the VMC referred to a study on water quality undertaken in 2010, which showed that *E.coli* was quite high due to sewage works from Tulbagh. The contaminated water came from Ceres. The respondent stated that there needed to be research about chicken farms along the channels. A type of chicken worm (small, thin, red worm) had been found mainly in catfish and also carp. The farmers worried about the effect of the chicken worm on humans. The fish therefore needed to be well cooked, since each catfish contained a lot of worms, about a handful. Other concerns related to the drowning of livestock and 4 people. Each winter season, about 5 livestock were drowned. While there were a lot of fish in the dam, the carp and catfish tended to stir the mud and thereby mess up the water quality. The fishers therefore tried to catch these fish in order to control their population. The average size of fish was getting smaller. Bass are limited to two per angler per day.

The respondents further stated that the dam is owned by the DWA and supplies water to Cape Town. The area around the dam had natural heritage status which was signed by the former president Nelson Mandela. Land use around the dam included a chicken farm, a guest farm, several residential properties, a small eucalyptus forest, a fishing club, an angling club, a yacht club, DWA premises, City of Cape Town waterworks and CapeNature conservation land. Nature Conversation owned the area from the chicken farm, past Silwerfontein Guest Farm up until the forest. All the rest of the land was managed by DWA. The angling club operated on Friday, Saturday and Sunday. The fishing and angling clubs each had a water warden, who looked out for open fires. The farm had an agreement that the owner could graze use the area for grazing but could not take the cattle to the dam to drink. The fish were currently managed by the angling club. The dam had carp and catfish and, tilapia stocks were starting to grow. There was also small mouth and large mouth bass. The carp were taken out of the dam to increase the population of other fish species. The dam if used for recreational and commercial purposes would only work if electric-powered boats were used, to avoid pollution. Water samples were taken regularly. Since the dam had no natural feeder streams, projects were underway to build more channels to connect the dam to rivers and thus augment water supply and improve water quality.

Access to the northern part of the dam was controlled by a gate with 4 locks: one lock each for the angling club, fishing club, farm and visitors. A membership fee of R250 is paid per year at the angling club. Any dam must be controlled. Van der Merwe was worried about who would manage the dam if it was opened to public access. On the far side of the dam there was a place reserved for public access but had yet to be actively used. There had been talk of opening the dam to public access. Jonathan Barnes from DWA is one of the people advocating for opening the dam for public access. This would be done through issuing day passes to allow people on the side through which water flows into the dam. The problem was that there were no toilets, no fire places and people might swim in the dam water. Before the dam was opened to the public, infrastructure was required. For example, Silwerfontein Guest Farm followed strict rules on refuse disposal. There were also concerns about crime if the dam was opened for public access. The last break-in was about 2 years ago. Problems would arise if people could come in by car. Some people had tried to shoot oryx close to the dam and CapeNature Conservation had dealt with them.

Commercial fishers from Stellenbosch had asked to use the electric shock technique to bring up the fish and harvest them for the market. The fishers wanted the small fish, like catfish. There was a huge market for fresh water fish and this would improve the water quality but would affect competitions. The fish weight ranged from 4 to 8 kilogrammes. However, the suitability for human consumption had yet to be ascertained since some of the fish had died from worm infestation and catfish ate the dead fish. Ducks had also died. The source of problem was thought to be the nearest chicken farms, which opened around 2006. The waste management system of chicken farms along the channel needed to be checked. The sustainability of commercial fishing was not known. Some anglers were concerned about who would monitor the fishing in terms of species and number caught, if commercial fishing was allowed.

Local, illegal fishers climbed over the gate and carried out fishing. These fishers were from Wellington, Tulbagh and Porterville and fished for subsistence. The anglers helped them and sometimes gave them bait and taught them how to catch fish. There was no gill net fishing on the dam. Subsistence fishers usually caught carp and catfish. Angling competitions removed carp and gave the catch to farmers, who gave the fish to their casual workers and households. Sometimes, the anglers gave the fish to child welfare. People from Stellenbosch were making biltong from catfish and selling it.

4.5.3 Findings from a Stakeholder Consultation Meeting

Following individual field interviews and consultations, the researchers requested members of Voëlvlei Management Committee (VMC) to convene a stakeholder consultation meeting to discuss various issues pertaining to this project (WRC 1957), particularly issues of access. Various institutional stakeholders attended the meeting, and representation included Western Cape Department of Agriculture, DWA, Silwerfontein Guest Farm, Cape Nature, Voëlvlei Yacht Club, Witzenberg Angling Club, Commercial Fishing and the Western Province Artificial Lure Angling Society (WPALAS)). Researchers included Dr Mafa Hara and student Bulelwa Ngwexana (University of the Western Cape) and Barbara Tapela (ACWR).

Access by Commercial Fishing

An official of the Western Cape Department of Agriculture gave an outline of the proposed pilot commercial fishing project. The project envisages using Voëlvlei Dam as a pilot commercial inland fishery for a period of 12 months whilst considering the interests of local communities and all other stakeholders.

A question was asked about possible interference of commercial activities with recreational activities, such as angling and yachting. Representatives of recreational angling and yachting clubs responded that the two types of fishing activity could coexist. Researchers asked a question about the possible impacts of commercial fishing on subsistence fishers, who are reportedly informal and under-documented. Responses were not clear, perhaps owing to the fact that these fishers largely fall outside the radar of mainstream fishing activities on the dam. Nonetheless, there seemed to be an acceptance of the principle of ensuring that members of local communities shared the access to benefits from Voëlvlei fishery development.

The DWA representative advised that the project would need to apply for a licence as per compulsory DWA rules and regulations. Comments by other stakeholders at the meeting were that there would be a need to establish the size of the fish population in order to assess viability and formulate appropriate resource management regimes. An issue discussed was that the selling of freshwater fish by the public is not allowed. Reference was made to VMC rules that recreational anglers should not sell fish and should adhere to the bag limit of 2 bass per angler per day. A pertinent question for commercial angling therefore revolved around the balance in utilization for profit of indigenous and alien fish species.

A point was raised about the relationship between availability and demand for invasive species. One participant cited that certain demographic records indicate that there are approximately 100,000 “migrants” in Cape Town and statistics such as this could be used to determine the viability of commercial harvesting.

Cape Nature asserted that it was not willing to allow the commercial use of fish with a conservation value, such as indigenous species. Consequently, restrictions would be made by Cape Nature on the type of nets

used. A point was made about the desirability of commercial fish farming, which targets invasive species such as carp, catfish and tilapia. Stakeholders conceded that the removal of invasive species, such as through angling club harvests, was beneficial to dam ecosystem conservation. However, the public at large could not be allowed to sell such catch. A concern was raised that the targeting of high value species, such as small carp, might result in specialization, which might in turn become the driver of commercial fishing rather than conservation interests.

It was resolved that the pilot project would be implemented. Carp which was more than 3 kilogrammes would be released.

Issues of Broader Public Access to Voëlvlei Dam Fishery

This discussion revolved around the following issues: access gates and road; siting of public fishing areas; siting of public toilets and sewage disposal; fire control; littering; public awareness and information; and management of fishing. Stakeholders stated that up to the recent past, access on foot has been unrestricted while access by car has been controlled. The statement was further qualified. The public historically had access close to the dam wall and near the City of Cape Town pump station, but due to dam safety issues, especially vandalism, public access was restricted. DWA stated that while these restrictions applied to public access, recreational anglers continued to have access to the dam. DWA further stated that currently, access to the dam is open to the public, since the dam is public infrastructure and there was an expressed need to broaden public access.

Silwerfontein Guest Farm responded that it controls access and charges fishers a fee of R30.00 for access to the dam through the entrance gate and access road, which the owners of the guest farm had privately built. Paying guests visiting the guest farm [and often travelling by car] did not pay the gate fee. Guests are provided with copies of VMC rules and regulations for fishing and related activities. Silwerfontein also allows access to residents of five of the ten sub-divided farm plots, which the guest farm has sold. These views elicited further debate. DWA asserted that the said access road is specifically for access to Silwerfontein Guest Farm and to the hiking trail, but not to the dam. DWA, rather than Silwerfontein, authorises access to the dam. Silwerfontein countered that the guest farm was allowed to use the dam for fishing and recreation, but not for motorized boating.

The VMC representative stated that the management body decided on rules and issues arising with regard to fishing. However, when public access became broadened, VMC would have no control over access. VMC asked the question: Who will manage public access?

DWA responded that, as the dam authority, the department has overarching responsibility for stakeholder issues pertaining to land and other interests around the dam, but no capacity to manage public access issues on the dam by itself. Meanwhile, the authority of VMC is limited as VMC does not have mandate over control of access to the dam basin. VMC commented that DWA was happy at one stage to devolve control to VMC, and asked why is there a change? VMC further argued that, on the one hand, issues of public access required integration and coordination as well as collective action, for example, the management of public toilets and removal of sewage. DWA, on the other hand, had no capacity to effectively manage such issues. DWA conceded that there was a need for broader coordination with other departments, and surmised that until such time that there was effective coordination of Voëlvlei Dam management, the decision was that there would be no restriction of public access.

Lessons Learnt about Broader Public Access in Voëlvlei Dam

The VMC chairman, shared past experiences with broader public access to Voëlvlei Dam. Fishing started on the dam in 1968. Around 1970 to 1971, the dam wall was opened to the public. In 1980, “things got bad”. Problems included littering associated with ice cream sellers and uncontrolled fishing. Every Monday, DWA had to send a truck to clean up litter and other rubbish. Volumes of litter were significant. Recreational anglers came from all around the dam and from as far afield as Cape Town, and they targeted trout and other species. Due to these problems, DWA closed the dam off to the public. Only VYC remained operating on the dam. After closure, one recreational came to DWA to request access to the dam. He was advised

to form a recreational angling club, which is how such clubs started at Voëlvlei Dam. Since there are 30 to 40 angling clubs in the Western Cape, and umbrella body, WPALAS, was formed and given permission to use the dam[8].

Permits for individual recreational anglers were available from either Silwerfontein or from the WPALAS. WPALAS permit holders have access to WPALAS grounds, which have toilet and barbeque facilities. Camping facilities are also available if required. Voluntary "water wardens" (who are WPALAS members) regularly keep records of all visitors on weekends, checking for illegal entries and ensuring the adherence to Voëlvlei rules and regulations as devised by VMC. The area to be utilised by all visitors (i.e. public in general) is approximately 4 km on the east bank of Voëlvlei, "stretching from second canal to just past the forest".

Regarding WPALAS experience with control of public access, the club charges R10.00 for access gate keys issued to non-members on a day visit basis, as well as R10.00 for access per day entrant. The former amount covers the costs of R2.00 for printing the key card and R3.00 for key cutting, and therefore profit is R5.00 per key per entry by non-members who obtain access keys from WPALAS. Income from key-holding by members of WPALAS can be calculated as R2050.00 per annum for each of the 110 members of WPALAS. This amount can be broken down into R900.00 per year for security, R840.00 per year for the permit to park a caravan on site and R310.00 in membership fees, which include a gate key. Not all members hold individual keys or rent caravan sites. Currently, 60 members of WPLAS hold individual keys. Members with no caravan site therefore pay only R310 for membership and R10.00 per day for the use of braai and toilet facilities.

The VMC permit system was created for access by the public, but these were informal rules since VMC did not have the mandate to control public access. He asked the question: How can the existing VMC permit system be reconciled with the need to open up access? DWA responded that he did not agree that VMC will fall away with the broadening of public access. However, DWA has a mandate to open up public access, because the dam basin is public property, and therefore there is a need to find a way forward.

The DWA representative related the licence to fish to a water use licence. He also alluded to the prioritization of emerging farmers and black economic empowerment (BEE) candidates in the issuing of new licences. Barnes further mentioned that the General Authorisation S53 agreement applied to the use of Voëlvlei Dam by the 9 recreational clubs. In terms of the S53 agreement, specific areas are allocated to angling clubs, such as WPALAS. However, this instrument did not help to broaden public access. He based his view on the fact that, since DWA had tabled before WPALAS the need for cooperation in broadening public access, WPALAS had responded that it was restricted to 99 members. Such restriction has since fallen away, but the current upper limit of 120 for WPALAS memberships still not broad enough.

Conclusion of Meeting: Reconciliation of Issues Raised

Towards reconciliation of issues raised during the meeting, stakeholders highlighted several key issues. While there was no objection to the pilot commercial fishing project on Voëlvlei Dam, there were diverse views on the issue of broadening of public access. The latter difficulty was related to perceived uncertainties about changes to existing institutional arrangements and structure of access to fishery benefits.

Regarding commercial angling, the collective resolution was that there were no objections to the launching of a pilot project, since commercial fishermen will not interfere with recreational activities. It was noted that at the present water level, clean areas for netting were available and carp of over 3kg would be released.

The Silwerfontein Guest Farm owner reiterated the need for broader stakeholder participation in discussions on the development and sustainable utilisation of Voëlvlei Dam for inland fisheries and their contribution to rural livelihoods. She also underscored the importance of ensuring that benefits from the dam were shared more broadly with members of local communities and the public in general. Muller affirmed that

[8] The angling clubs are affiliated to WPALAS and include the Western Province Board of Lure Anglers, the Western Province Freshwater Angler's Association, the Tulbagh Angling Club, the Witzenberg Angling Club and the Cape Piscatorial Society.

broadening access could potentially address the needs of the poor and unemployed in the surrounding farms and settlements, such as Gouda and Sonkwasdrift. She surmised that what was required was a way of ensuring that benefits were shared in ways that did not undermine the ecosystem. She gave an example that the southeaster wind in the Voëlvlei Dam area had a peculiar tendency to blow with such strength that the spreading of braai fire was a real hazard. This necessitated the careful siting of public access and picnic sites, fire control and awareness creation. She also pointed out that the dam provided a source of water for the City of Cape Town, and therefore the need take measures to avoid undue contamination.

The DWA emphasized that the issue of benefits, rather than access *per se*, was critical to the discussion. A critical question was: Who will benefit from the opening up of access? DWA stated the discussion had to be approached from a community beneficiation perspective. Other key questions revolved around markets and the cooperation between commercial, recreational and subsistence fishing interests within Voëlvlei Dam fishery. The DWA was only a custodian of Voëlvlei public property and therefore had no right to keep the public out. Consequently DWA would not restrict access via the gate close to the DWA Voëlvlei village. In the interim, although DWA will not employ gate keepers, entries will be informed of the "no open fires" policy of VMC. Hopefully, there would be broader participation of stakeholders, such as the municipality, and the institutional and practical challenges will soon be resolved.

The Western Cape Department of Agriculture, stated that the Comprehensive Agricultural Support Programme (CASP) had set aside R10 million for the benefit of AgriBEE, which included strategic partnerships. There was a need therefore for the issue of benefit sharing to be explored within such context. The Department of Agriculture, alluded to possible strategic partnership opportunities that might emerge from the proposed experimental commercial fishing project. Regarding sustainability of water volumes, the DWA informed the meeting of an envisaged plan to increase the volume of the dam and augment water supplies to City of Cape Town by 2014.

4.6 Discussion and Conclusion

An important finding from fieldwork at Voëlvlei Dam and surrounding areas was that this inland fishery has a multiplicity of organized and unorganized key stakeholders, who have varying interests and access rights. Identified primary stakeholders include commercial and recreational fishers, angling clubs, informal subsistence fishers, a yacht club, local farmers, Silwerfontein Guest Farm, local communities of Gouda and Sonkwasdrift, residents of surrounding farms and City of Cape Town. Secondary stakeholders include DWA, Cape Nature, Western Cape Department of Agriculture, Tulbagh Local Municipality and a local Water User Association (WUA). The dam possesses a well organised and active dam management committee, which seems to be effective in managing fishing and other activities on the dam. However, participation in Voëlvlei Dam management, decision-making and access to fishery benefits has not involved all valid stakeholders. The various organizations and the management structure are not representative enough of the diversity of interests in the fishery. In particular, the upper limit of 120 for WPALAS membership and the high membership costs exclude many fishers and anglers, particularly those from the local historically disadvantaged groups, who are largely black. Black women from surrounding localities have been identified as a beneficiary group requiring specific consideration in interventions to develop Voëlvlei Dam fishery. Members of VMC concede that the involvement of a broader range of stakeholders, including marginalized groups and other government departments, is required.

The need to broaden stakeholder participation should be viewed in light of the existence of diverse views about fishery usage and future plans for the dam. There has been interest in opening the dam for public access as well as commercial fishers, who want to harvest invasive and exotic fish species. Some stakeholders, such as the recreational anglers and farmers, are against opening the dam for public access, although such dissension was not vocalized during the multi-stakeholder meeting. Those dissenting are concerned about crime and the lack of amenities and infrastructure. With regards to commercial fishing, the stakeholders are mainly concerned about sustainability. There seems to be a need to further explore more comprehensively, through broader stakeholder consultations, possible options of sustainably developing Voëlvlei Dam fishery.

This report concludes that it is important to analyse and address the governance and access issues on the basis of sound governance principles and evidence (i.e. data). A major decision facing Cape Nature, as manager of the fishery, is whether or not to allow commercial fishing. From the foregoing stakeholder views, there seems to be a case for allowing commercial fishing since populations of carp and catfish have significantly increased thereby reducing the quality of the bass fishing, which attracts tourists. The problem is how to achieve equity of access in allocating a commercial fishing permit. The report also concludes approaches to determining the viability of commercial fishing enterprises, and market demand in particular, need to be based upon sound definition of the term 'migrants', which is currently used by some to refer to black people living in the Western Cape, mostly from other African countries. Viability assessments should also be predicated upon reliable demographic data and tested assumptions about freshwater fish consumption in the Western Cape. In the context of the apartheid history of discrimination and recent xenophobia against migrants of African descent in post-apartheid South Africa, the need for institutional arrangements for inland fisheries to be based upon sound governance principles and tested data is imperative.

4.7 References

Barnes, J (2011) Department of Water Affairs, Personal Communication, May 2011.

Big Bass Fishing: Voëlvlei Dam. Internet [***http://www.bigbass.0catch.com/id5A7.12.htm***] 6 June 2011

Berg River Catchment Management Area. Internet [***http://www.dwa.gov.za/iwqs/rhp/state_of_rivers/berg04/berg3.pdf***] 6 June 2011.

Drakenstein Municipality Integrated Development Plan (IDP) 2011/2012. Internet [***http://www.drakenstein.gov.za/Administration/Documents/Documents%20For%20Citizen%20Viewing/IDP/2011-2012/IDP%20REPORT%202011-2012.pdf]*** 24 June 2011.

Drakenstein Municipality Integrated Development Plan (IDP) 2011/2012: Gouda. [***http://www.drakenstein.gov.za/Tourism/Gouda/Pages/GoudaHome.aspx***] 9 June 2011.

Endemann, F (2011) Western Cape Department of Agriculture (Elsenberg), personal communciation, 08 September 2011.

Lewis, M (2011) CapeNature, personal communication, June 2011

5 FLAG BOSHIELO DAM, LIMPOPO PROVINCE

Figure 7 Fisher selling a silver carp from Flag Boshielo dam

5.1 Introduction

The research was undertaken on the 17th and 18th of June 2011. The researchers were Vimbai Rachel Jenjezwa, who is a prospective UWC doctoral student, and Mr Attorney Gezane Hlongwane, who was the research assistant. Prior communication had taken place with some community members including the ward councillor who arranged a meeting with the community leaders. The community members explained the purpose of the visit and how the information that they provided would help the community.

5.2 Methodology

The research methodology used was focus group interviews and informal discussions. Focus group interviews were held with three members of Sehlo-kola aquaculture and the traditional leaders. As a follow up to the fieldwork undertaken, the Ephraim Mogale Local Municipality Manager was contacted telephonically.

5.3 Background to the Study Area

5.3.1 Location

Flag Boshielo Dam is located within the Sekhukhune District Municipality of the Limpopo Province. The dam is located in Ward 16 of the Ephraim Mogale Local Municipality (formerly Greater Marble Hall Municipality). The nearest town is Marble Hall. The dam is situated about 30 kilometres northeast of Marble Hall along the Mokopane – Marble Hall Road. Other surrounding villages and towns include Phetwane, Tsimanyane,

Tompi Seleka and Kromdraai. The Schuinsdraai Nature Reserve borders the south western region of the dam. The Tompi Seleka College of Agriculture is also close to the dam[9].

5.3.2 Socioeconomic Profile

According to the 2007 Community Survey, the population of the Ephraim Mogale Local Municipality was 124 510. The population that lives in the rural areas is 88.2%. The municipality has five traditional leaders. The traditional leaders are consulted in regard to all local governance matters and are invited to all Council and Integrated Development Plan (IDP) representative meetings. The population of Phetwane village is 889 with 162 households. Challenges of underdevelopment are faced in the municipality. Farming is the main source of employment and economic activity in the area (Ephraim Mogale Local Municipality, 2011). Many of the communities have no financial means, lack education and skills, and live in abject poverty. Service delivery priority issues include access to basic services such as bulk water in some of the villages that are currently dependant on water tanks, improved sanitation infrastructure as well as electrification in the rural areas and newly established townships. The unemployment rate is high at 58% and this poses a serious challenge to the Council for the provision of free basic services as well as payment of services. 60% of the unemployed are female and 72.1% of the population earns R2 500 per month. Therefore, there is need for job creation especially for women. This would improve the economy through increasing the number of economically active people. According to the IDP BUDGET 2010/011, funds were budgeted for the Phetwane irrigation farm and for the provision of earthen fish ponds in all municipalities. R20 million was budgeted for the fish ponds between the years 2010 and 2015 through implementation by the Limpopo Department of Agriculture (LDA) (Sekhukhune IDP Budget, 2011).

5.4 History and Management of the Inland Fishery

Flag Boshielo Dam was initially known as Arabie then it was later renamed after a political activist and freedom fighter, Marutle Flag Boshielo[10]. The dam was built along the Olifants/Lepelle River and completed in 1987. Dam construction was financed through state funding. Dam objectives included irrigation and domestic water supply. One the one hand, a water board, Lepelle Northern Water Board, acts as Water Service Provider (WSP) on behalf of Greater Sekhukhune District, operates a small water purification plant below the dam wall and provides water supply to various urban and rural settlements within the district. The water board abstracts raw water directly from the dam, via a pipeline. On the other hand, the provincial Department of Agriculture (LDA) supports a number of smallholder irrigation schemes downstream of the dam. In 2006, the dam wall, which was 36 metres high, was raised by 5 metres. Reasons for the upgrade included a need to manage the risk of water shortages by catering for increasing irrigation and domestic water demand as well as projected increases in water demand from existing and planned platinum mines within the dam hinterland. The dam adjustments were also meant to enhance social upliftment and economic development whilst contributing to sustaining riverine ecological health. The negative social and biophysical impacts were believed to be of a small nature and intensity as compared to the benefits[11]. The raising of Flag Boshielo Dam wall, however, resulted in the flooding of the old Marble Hall fish breeding station, which historically supplied fish stocks to the dam.

Fish species caught on the dam include carp (Common, Mirror, Grass and Chinese Silver), yellowfish (Large Scale, Small Scale and Papermouth), catfish (Sharp Tooth, Butter and Squeaker), tilapia (Blue, Red Breasted, Rumors of Nile, Vlei and Dwarf), eels (Giant Mottled, African Mottled and Longfin or Black), barbs (Papermouth, thee-spot bream, tail spot, Silver and Red fin), labeo (Muddies, Red Nosed, Leaden and Purple or Red-scaled), robbers (Dwarf Tiger and Silver), bass (Large mouth) and mormyrid (Churchill or Dolphin)[12]. Recreational anglers and angling clubs, such as Classics Spinfishing Society and others affiliated to South African Artificial Lure Angling Association, have been using the dam since its construction. Numerous angling competitions and tournaments are reportedly hosted at the dam every year.

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[9] Source: ***http://plak.co.za/moreinfo.php?id=18699***

[10] Source: ***http://www.sahistory.org.za/people/marutle-flag-boshielo; http://www.wildliferesorts.org/limpopo-resorts/sekhukhune/tambotie-ridge-lodge.html***

[11] Source: ***http://www.info.gov.za/view/DownloadFileAction?id=64862***

[12] Sources: ***www.sealine.co.za; www.wildliferesorts.co.za; www.clearwaterbass.co.za***

The dam infrastructure and water resources are managed by DWA. Environmental resources, such as fish and other aquatic species, are generally managed by the Limpopo Department of Economic Development, Environment and Tourism (LEDET), which also delegates management responsibility to Schuinsdraai Nature Reserve for fishing conducted from reserve land and restricted public land under DWA management. It is worth noting that an informal co-management arrangement is emerging organically, which involves stakeholders such as DWA, LEDET, the nature reserve, private land owners and rural local communities. This arrangement is emerging in the context of a major problem regarding poaching by commercially-orientated net fishers from further afield. It is also worth noting that early in 2008, DWA reported an incident of fish deaths in Flag Boshielo Dam [13]. The context was that in December, the dam catchment area experienced "good" rainfall that left some of the dams, such as Flag Boshielo, overflowing. Initial assumptions were that excessive rainfall had caused most of the fish to die. However, subsequent series of chemical and bacteriological analyses by DWAF Resource Quality Services at Roodeplaat laboratories of samples taken from points upstream and downstream of the dam revealed no indication of chemical or faecal contamination that could have lead to the killing of fish. Such an incident points to a need for a coordinated framework for managing this fishery.

The Limpopo Environmental Management Act (Act 7) of 2003 provides a legal framework for techniques and practices regarding utilization of fish within the dam. Chapter 6 of this Act deals with aquatic biota and aquatic ecosystems. Sections 56 to 60 give regulations on the catching of fish, use of fish nets, traps and other devices, closure of the angling season, protection of aquatic ecosystems and pollution of aquatic ecosystems and other regulations. The Act prohibits the conduct of fishing activities without a permit and within a protected area. Among other things, the Act also prohibits the use of more than 2 fishing lines or 2 hooks on a line, the hooking of a fish on any body part other than the mouth, the use of fish poisons, fish feed in fishing spots and electrical or explosive methods of stunning and/or killing fish. Effectively, the Act allows the use of specified angling techniques but prohibits the use of fish traps, nets and other obstructions, such as used by many fishers in Pongola, Makuleke, Nandoni, Fundudzi, Masibekela and Mid-Letaba. According to Section 54:2 of the Act, the above provisions do not apply, however, to the following persons fishing in an aquatic system that has been artificially created and that is totally surrounded by: Owners of that land; a family member of the owner; a full-time employee of the owner, acting on the written instruction or permission of he owner; and any other person acting with the written permission of the owner.

Although the Limpopo Environmental Management Act provides overarching guidelines on acceptable fishing techniques and practices, there are currently no dam-specific guidelines governing bag limits for various fish species in Flag Boshielo. These institutional gaps raise critical questions about the governance and management of the fishery, particularly in light of reported the rampant increase in poaching by informal commercial fishers, who use various types of nets, boats and rafts. The study also found that there is currently a waiver on the requirement for anglers and fishers to obtain permits for fishing outside of nature reserves and similar protected areas.

The Permits Officer at LEDET stated that the department no longer issued permits for fishing outside protected areas (Makhubele, 2011). Prior to the prevailing waiver, formal access to and use of fishery resources was governed by the Limpopo Environmental Management Act. According to the Act, which has not been repealed, access to fisheries within nature reserves and similar protected areas is subject to permission by relevant protected area management authorities, such as Schuinsdraai Nature Reserve, to whom LEDET has delegated the responsibility for issuing such fishing permits. Previously, the only requirement for access through the DWA gate was that anglers should possess a valid fishing licence. This permit, as well as access through the DWA gate, was and still is issued by Schuinsdraai Nature Reserve.

The Limpopo Environmental Management Act also states that written permission to fish can be given by owners of land around a fishery. While this legal instrument, in the past, accounted for access via privately-owned farms, there seems to have been a lack of clarity regarding access via communal lands.

[13] 'Dead fish at Flag Boshielo Dam'. Electronic report published by DWAF on 21 January 2008. In the South African Government Information website (***http://www.info.gov.za/speeches/2008/08012209451002.htm***) Accessed on 10/09/2011.

The Act, as it stands, still raises questions about rights of access with respect to communal lands. Such questions arise because the Communal Land Rights Act of 2004, which sought to give ownership rights to rural communities, is currently suspended and there is therefore no clarity on access rights pertaining to communal lands. Management issues therefore need to be examined in light of land tenure in areas surrounding the dam.

Land tenure around Flag Boshielo includes communal lands, premises of DWA, Schuinsdraai Nature Reserve, Tompi Seleka College of Agriculture, one community-based fishing camp and privately-owned commercial farms. Schuinsdraai Nature Reserve, private farms and DWA premises provide formal access to recreational anglers, angling clubs and local fishers. However, there are reports of irregular entry and use of illegal nets through these areas. By contrast, communal lands provide both formal and informal access to various categories of anglers and fishers, as well as angling clubs. Within communal lands, formal access for recreational, subsistence and commercially orientated anglers and fishers is via the premises of the recently established community-based Matlala Aloe Park eco-tourism resort, which is also described as a "fishing camp". Gill net (and other net) fishers and poachers also reportedly access the fishery via Matlala Aloe Park. Informal access for anglers and fishers, who use fishing rods and hand lines, is mainly through communal land immediately below the Flag Boshielo Dam wall. However, this fishing area is currently not favoured due to possible risks of crime, since a number of fishers and anglers have been accosted while fishing and/or camping.

With regard to communal lands around Flag Boshielo Dam and associated riverine fisheries, a brief outline of the historical background might help to clarify some of the dynamics around control over access rights. Communal lands fall under the traditional leadership of *Kgoshi* Matlala of the Pedi speaking baKone-ba-Matlala group of people. Traditional leadership gives permission to occupy or use the land, while the local municipality assumes responsibility for the development of infrastructure and services on such land. The historical background[14], according to Claasens (2001), is that baKone-ba-Matlala people arrived in Rakgwadi in 1957 following their move from Madibong in Sekhukhuneland. This move was related to Pedi people's resistance to *bantu* authorities' 'betterment' policy and to the policy of 'tribal self-rule' in Sekhukhuneland and the apartheid authorities' efforts to undermine this resistance. *Kgoshi* Frank Shikoane Matlala Maseremule, father of the current *Kgoshi* Mokgome M. Matlala, was among the first headmen (*dikgoshana*) to break resistance and accept from the apartheid government chieftainship of a separately recognised baKone-ba-Matlala tribe (Claasens, 2001). He was offered twenty-two farms near Marble Hall, including Hindustan and others around Flag Boshielo Dam, to accommodate his people. This land was purchased after 1936 by the state from white owners and allocated in trust to various communities living under the authority of their respective chiefs and village heads, principally Chief Matlala (Claasens, 2001; Lahiff, 1999). The land purchase was linked to the promulgation of the Native Trust and Land Act 18 of 1936 and resettlement of baKone-ba-Matlala to events preceding the passing of the Bantu Promotion of Self-government Act of 1959 (Lahiff, 1999:19, Claasens, 2001). Interviews with traditional leadership and members of Phetwane community, which is one of the baKone baMatlala communities closest to Flag Boshielo Dam, revealed that the traditional leaders continue to exercise control over access to communal land around Flag Boshielo Dam fishery.

All recognized key stakeholders have raised concerns about the use of gill nets and other nets on the dam. These stakeholders complain about the lack of clear formal regulations and institutional arrangements regarding permitted fishing techniques and practices. Currently, LEDET Environmental Compliance and Enforcement officers and rangers formally monitor the use of nets and remove any nets found in the dam. Private operators informally assist these officers and rangers in this work, while local communities formally collaborate by reporting activities of commercially-orientated poachers, who use nets. The nets, boats, rafts and caught fish are confiscated, and the nets are destroyed. DWA, Schuinsdraai Nature Reserve and Matlala Aloe Park are also engaged in an as yet informal collaborative effort to control various problems, such as gutting of fish and littering on the dam shores, which negatively impact on water quality, and use of nets. However, there are as yet no agreed bag limits and informal commercially-orientated angling and net fishing are rife.

[14] Excerpt from Tapela, B. N. forthcoming 2011. Unpublished doctoral thesis, PLAAS, University of the Western Cape.

5.5 Characterization of Indigenous Knowledge and Current Fishing Practices and Techniques

5.5.1 Findings from Institutional Actors

Limpopo Department of Economic Development Environment and Tourism (LEDET): Commercial Fishing Practices and Techniques

In addition to interviews with the Permits Officer on the issue of fishing permits, researchers interviewed the LEDET officer responsible for Environmental Compliance and Enforcement at Flag Boshielo Dam[15]. The focus of the interview was on issues relating to current subsistence, recreational and commercial fishing in the dam. The officer stated that he and his team of six rangers are responsible for patrolling, arresting and handing poachers over to the police in Marble Hall and Motetema[16] so that they can be charged with criminal offence. Since this team operates throughout Sekhukhune District and is based at Tompi Seleka College of Agriculture, which is close to Flag Boshielo Dam, they often face logistic difficulties whenever they have to attend to problems in dams further away. Such problems include poachers running away before they arrive. According to the official, the biggest problem in Flag Boshielo Dam Fishery is rampant illegal commercially-orientated net fishing. Both large-scale and small-scale poachers are involved in this practice.

The largest among commercially-orientated poachers use gill nets that are 500 meters long, paddle boats and rafts. The large nets have been found to each catch between 400 and 500 fish. Whenever the LEDET patrol team apprehends the illegal net fishers, it confiscates all their nets, boats, rafts and caught fish and hands them over to the police to be charged. To date, the LEDET compliance and enforcement team has confiscated 15 boats. Although the team does not catch such poachers every week, whenever they do, they often find them with 5 to 6 nets each. The poachers come by private 'bakkies' (i.e. vans) from far away places, such as Tzaneen, Louis Trichardt and Phalaborwa, where they have reportedly over fished their local dams, such as Nandoni and Middle Letaba. They camp within or close to various fishing spots around the dam, including Matlala Aloe Park. They often wait until officers and rangers have "knocked off" from work, which is at 1630 hours. At around 1700 hours, the poachers then go into the dam and set up their nets and collect them and the catch between 1200 and 0100 hours at night, often before the patrol team arrives for work in the morning. Whenever these poachers are spotted leaving the dam, their bakkies are observed to be "loaded to the brim" (i.e. overloaded) with both the nets and fish. This is because the poachers are too pressed for time and afraid of being caught that they do not remove the fish from the nets on site but simply load everything and "take it home".

Such evasive practice has compelled the patrol team to modify its daily routine such that they currently conduct spot checks at odd hours of day and night. The fact that the team now has a motorised boat at their disposal has helped in making dam patrols more effective. This strategy has resulted in a slight reduction in these poachers' activities. However, the strategy has also compelled the poachers to change their fishing gear and tactics. Whereas the large-scale poachers used to bring paddle boats, which they bought for about R1000 from retail outlets such as 'Solly's Discount Centre', they now use cheaper rudimentary rafts. Not only do the rafts represent a smaller loss than purchased boats, but they enable the poachers move around undetected. This is because the rafts are made of fencing raw material, such as aluminium tubular pipes, metal droppers and sisal ropes. Commercial poachers ferry these apparently 'harmless' items by bakkie and assemble the rafts close to the dam. The construction of the rafts is such that groups of 10 sisal cords are bunched together and inserted as "parallel" strands into aluminium pipes, which are then fastened together and held firmly flat by metal standards. The standards are set between 50cm and 1m apart. The poachers then wait for opportunities to launch their rafts undetected, enter the dam and set up their nets. They seem to be inured to the threat of crocodile attacks, of which Flag Boshielo Dam has a relatively high population, with one count recording 139 crocodiles on the dam shore alone. In light of the possibility of crocodile attacks, the LEDET patrol team is therefore not only concerned about environmental issues but also about safety issues.

The respondent stated that the LEDET compliance and enforcement team has also apprehended smaller commercially-orientated net fishers, who often reside in places that are closer to the dam, such as local communities. These fishers employ similar tactics and techniques as those used by large-scale commercial

[15] Interview with LEDET Environmental Compliance and Enforcement officer, Mr Rufus Mphahlele, 12 September 2011.
[16] Motetema is a small township located approximately 10 km from the town of Groblersdal.

fishers, but their nets are smaller and more varied, including beach seine nets, gill nets and other home-made nets. Both men and women fishers are involved in this illegal practice. The women fishers often use bunched up dry sisal cords, which the put into the water to trap fish. The respondent cited the case of a female poacher, was once apprehended in Flag Boshielo Dam with a baby on her back, casting her sisal trap and net from a raft such as described above. Small-scale commercially-orientated net fishers rely on informal markets along local roadsides and within local communities. The respondent could not say whether or not local communities cooperated with LEDET staff in reporting illegal net fishing by members of their own communities.

Although the LEDET patrol team has modified its daily routine, it is not possible for the team to patrol all parts of the day all the time, particularly at night. Difficulties are also due to that the team is spread too thinly across the whole of Greater Sekhukhune District. These weaknesses in the management framework have been exploited by the poachers, some of whom are often found selling fish along the main road in the morning. The respondent stated that without any clear guidelines in the Limpopo Environmental Management Act regarding the informal sale of fish on the roadside, it was not possible for his team to confiscate fish that they were certain had been poached during the night. Due to these challenges, the LEDET team has had to adopt a few co-management strategies, some of which are formal and others informal.

Firstly, the compliance and enforcement team has formally adopted a Community Outreach programme, whereby they explain to member of local communities the importance of the need for them to jealously guard the fishery and contribute to ensuring that it is sustainable in the long term rather than overfished. One of the reasons given is that members of local communities will derive economic benefits from the fishery, through various existing, planned and proposed ecotourism ventures, such as those for Matlala Aloe Park, Schuinsdraai Nature Reserve and communal lands, respectively. A second reason advanced is that it is not fair that local communities, who live with the costs associated with the dam and fishery, should allow large-scale commercial poachers to decimate the fishery while taking its benefits to places far away, for the direct benefit of a few individuals, who have not suffered any costs for dam and fishery development. Communication between the conservation staff and local communities has given rise to a shared sense of responsibility, and the latter now willingly provide reports of any commercial poaching activities[17].

Secondly, the LEDET compliance and enforcement staff has set up an informal "joint venture" with all key stakeholders around the dam, with the objective to cooperatively manage problematic issues surrounding the fishery. Therefore, besides reports of poaching by members of local communities, DWA, Schuinsdraai Nature Reserve, eco-tourism operators on private farms, and Matlala Aloe Park assist in surveillance of illegal fishing activities and the removal of nets found in the dam. The police assist with charging those fishers caught contravening fishing regulations.

The combination of measures described above has reportedly contributed to a slight reduction in illegal commercial fishing activities. However, in the respondent's view, there is still a need for more effective means of managing the fishery. Compliance and enforcement of law and collaboration with other stakeholders is important but clearer guidelines on catch sizes and regulations on the selling of fish from the roadside are required.

Ephraim Mogale Local Municipality

The institutional actor consulted was Mr Burnett Marais, the Municipal Manager for the Ephraim Mogale Local Municipality. He provided the IDP plans for 2011-2016 and some information on the Bakone baMatlala fisheries based eco-tourism project.

According to Mr Marais, the history of community-based ventures linked to Flag Boshielo Dam fisheries dates back to the early 2000s, when Bakone baMatlala Trust project initiated an eco-tourism project that was not strictly a fisheries project. However, since most of the visitors to the Flag Boshielo dam do fish, it was anticipated that recreational anglers would be a key target group for the project. The ecotourism project

[17] Prior to this, members of Phetwane community reported that the large-scale commercial poachers often asked to rent from them space and electricity connections for their deep freezers.

was initiated in 2001 through the Phetwane community and the then ward councillor, Mr Fannie Lekola. The project was funded by the national Local Economic Development (LED) fund. The municipality was part of the project steering committee that met on a monthly basis. The first phase of the project involved erection of a perimeter fence. The second phase entailed the construction of a caravan site, ablution facilities and a swimming pool. The third phase involved the building of a conference centre. All three phases had been implemented by the time DWAF completed the raising of the dam wall in 2006. However, it was found that the project would be affected by the new water line and flood line. Consequently DWAF expropriated the project and is currently using the conference centre as offices. The compensation paid to Bakone baMatlala Trust was not enough to start a similar project.

Since then, the local municipality has compiled a Master Plan for the development of ecotourism in Schuinsdraai Nature Reserve and close to Flag Boshielo Dam. It is hoped that investors will be interested enough to develop the area in ways similar to what has been done around the Hartbeespoort Dam. There had been a few investors who wanted to develop a golf estate, hotel with conference facilities and water sports on community land next to the dam but negotiations with the relevant traditional authority failed. Nonetheless, the IDP for Ephraim Mogale Local Municipality states that the municipality plans to develop the Schuinsdraai Nature Reserve and, in particular, to develop tourist accommodation within the reserve by 30 June 2012. Objectives of the envisaged development are LED and job creation. Towards funding the project, a sum of R20 million had been sourced from the Department of Environmental Affairs and Tourism (DEAT) (Ephraim Mogale Local Municipality, 2011). The 2011-2016 IDP also states that plans to initiate a project to develop the Schuinsdraai Nature Reserve will be monitored by the Limpopo Tourism and Parks Board, which runs the reserve. The municipality is currently in the process of compiling a Market and Investment Strategy for the municipality. Flag Boshielo Dam and Schuinsdraai Nature Reserve development will feature in the Strategy. The Tourism Section of LEDET is building chalets at the Schuinsdraai nature reserve and so far has built 10 of these and upgraded the facility. Another phase in the upgrade is the construction of a restaurant.

Regarding decision making processes for Flag Boshielo fishery-linked tourism development, when the master plan was compiled, all role players including the community were involved. There was consensus that sensitive areas, such as the crocodile infested parts, had to be outlined so as to block them off from public access areas. Linked to these processes, there is also an investor who wants to develop eco-tourism facilities on community land and has met with the traditional authority on several occasions. This investor plans to develop water sports, nature travel facilities and a hotel but no progress has been made so far. The plan has reached a standstill. Ephraim Mogale Local Municipality has no conference facilities therefore there is a need for such facilities.

Department Of Water Affairs (DWA)

Repeated attempts to interview the relevant DWA official[18] were unsuccessful. Further attempts will be made to elicit views from this actor, who represents a key stakeholder institution.

Limpopo Department of Agriculture (LDA)

Efforts to get the views of this key stakeholder institution in March 2011 proved to be unsuccessful. Consequently, although this research benefited from useful inputs by LDA on the identification of study sites in Limpopo Province, this section does not capture views from LDA regarding fisheries associated with Flag Boshielo Dam. The same applies to sections on Nandoni, Makuleke and Middle Letaba Dams in Limpopo Province.

Schuinsdraai Nature Reserve

The manager of Schuinsdraai Nature Reserve confirmed that there were plans to develop an eco-tourism project in and around the protected area[19]. However, he pointed out that his main role was largely to implement environmental management, and he therefore referred tourism-related questions to a relevant official. Regarding environmental aspects, the reserve manager stated that Schuinsdraai provides members of the public in general with access to Flag Boshielo Dam fishery. Both recreational anglers and subsistence fishers

[18] DWA Manager at Grobersdal Office, Mr Kobus Pretorious

[19] Interview with Schuinesdraai Nature Reserve manager, Mr Solomon Manganyi, on 12 September 2011.

frequently obtained entry through access points controlled by the reserve, including the main gate to DWA premises. For those coming to fish, entrance fees were R25 per angling or fishing interest per day, plus R10 per person per day and/or R20 per vehicle. According to the reserve manager, the nature reserve provided camping sites and ablution facilities, and had not observed any problem of littering and gutting of fish along the dam shore. One of the rules was that the use of fishing nets of any kind was prohibited, and therefore such practice was illegal. However, there were currently no set bag limits, and serious and minor incidents of net fishing activities had been reported. The respondent confirmed that Schuinsdraai Nature Reserve staff members were working hand in hand with the LEDET environmental compliance and enforcement team.

The tourism officer at the nature reserve confirmed that there were plans to develop tourism facilities within Schuinsdraai and to effectively link these to the Flag Boshielo Dam fishery[20]. The planned resort would be located approximately 3km away from the dam shore, on reserve land "closer to the mountain than towards the dam". A key principle within such plans was to ensure that members of local communities benefitted economically from such development. Currently, local people from Phetwane rural community, Elandskraal Township and townships within the Marble Hall were employed in the construction of chalets and other facilities. However, such employment was short term. More sustainable jobs were envisaged in the post-construction phase, when members of local communities would be employed in actual tourism operations. However, the official could not provide further details on the exact nature and range of envisaged community benefits. At a later stage, ACWR researchers will obtain a copy of the Master Plan from relevant officials at the LEDET Head office in Polokwane.

Matlala Aloe Park

Matlala Aloe Park is a community-based eco-tourism resort that is owned by baKone ba-Matlala Trust[21] and leased out to private operators, Mr and Mrs Vermuelen. The resort was established in 2009 on communal land adjacent to premises of Tompi Seleka College of Agriculture.

The resort (or fishing camp) provides a launch for flotillas and boats, overnight camping facilities (ie. caravan and tent sites and ablution rooms), 24 hour security and electricity. The enterprise charges subsistence and recreational anglers R25 per person per day for access to the dam[22]. Formal recreational anglers and other tourists, who often arrive using private vehicles and/or towing boats and caravans, per day pay R35 per vehicle and R50 per electricity connection. Those staying overnight pay R50 per caravan site or R50 per tent site.

The resort is reportedly already popular with local subsistence fishers, recreational anglers and angling clubs, such as Classics Spinfishing Society and others affiliated to South African Artificial Lure Angling Association. A downside, however, is that the fishing camp has also become popular with commercial net fishers, who carry out illegal fishing activities from the camp at night and plug their own deep freezers in electricity connections provided by the resort. Although Matlala Aloe Park informs fishers and anglers about an informal rule "not to take home more fish than they can eat", the eco-tourism operators find it difficult to enforce this rule. Major stumbling blocks are that DWA does not require water use permits from commercial net fishers and that LEDET Environmental Compliance and Enforcement lacks sufficient capacity to deal with the endemic poaching practice. Matlala Aloe Park resort consistently assists with the monitoring of the use of nets and removal of any nets found in the water. Often, however, the operators and staff can only observe commercial fishers leaving with deep freezers full of fish since the resorts lacks both concrete evidence that nets were used and resources to patrol the lakeshore at night.

5.5.2 Findings from Rapid Appraisals of Fishers and Local Key Respondents

Interviews were held with several fishers and locally-based key respondents. Towards overcoming limitations of rapid appraisal by the baseline and scoping study, this report also makes reference to secondary data sources namely, blogs for recreational anglers and research reports on Water Rights in Informal Economies (Tapela, 2009) and Livelihoods and Agricultural Commercialization in Phetwane Irrigation Scheme (Tapela, 2008).

[20] Interview with Schuinsdraai Nature Reserve Tourism officer, Ms Linda Munyai, 12 September 2011.
[21] Interview with a representative and lessee of Matlala Aloe Park, Mrs Linda Vermuelen, 09 September 2011
[22] Interview with an informal angler from Phetwane village, 09 September 2011

Phetwane Community Leadership

Figure 8 Phetwane Community leaders in a focus group discussion with reseachers

A focus group discussion with Phetwane community leaders was held at the beginning of field research in the study area (Figure 8). The community leaders provided a brief history of the dam then spoke of fishing practices in the dam as well as the Sehlo-kola aquaculture project. The leaders said that before the dam was constructed, it was a river. The dam was built in 1985 (actually 1987, but 1985 could be when construction began) on the Olifants river. The river was previously named Mokgoma Matlala after the Chief. The dam was built by LTA Civil Engineering (now known as Aveng Grinaker-LTA Civil Engineering), Group Five, and Murray & Roberts as a joint venture. Locals were employed to build the dam. Prior to construction, the local leaders were asked for permission. They were told that if the dam was constructed, water could be used for domestic use through piping and irrigation. There is a water treatment plant that supplies water to the households via a pipeline. The dam was built for drinking water purposes and supplies more than 75 villages some of which include Mogalatsane, Tsimanyane and Letebejane. Before the razor fence was erected to close access to the dam, cattle would drink from the dam. The dam was just closed off without making an alternative drinking spot available for the livestock. The leaders' fathers used to grow plants on the presently irrigated land. The Chief had given the locals permission to occupy the land and used it to grow their crops and vegetables.

People used to fish in the river before the dam was built. The area belonged to them but since the DWA took over, they did have not had access to the dam. They used to use fishing rods purchased from Marble Hall. They cut the reeds, take fish line and tie a hook to the end and this is known as *lehlaka* in Sepedi. The types of fish caught are tilapia, carp, *moddervis* and catfish. The traditional method used to catch fish was *sefo* which is a trap with a small hole to let fish in but the fish cannot go out. Bait is put inside the trap. When the river was shallow and had pools, they used tree branches for the *modibo* tree that grows along the river. The branches would be joined together and the fishers would get into the water and drag the fish towards the bank using the net made of *modibo* branches. They do not use these methods anymore because the water is now very deep. They used to boil the fish in water and braai the fish in oil. Some people still fish (illegally) in the dam. Others fish in the river. When the dam was built, the whites brought in silverfish. It does not affect the other fish but is used to hold competitions. The leaders catch fish for subsistence purposes.

The method of netting is not good because they catch all sizes of fish. The selective (gill) net is better but they generally do not want to see netting because they believe that after a week, the fish population would have drastically decreased. They do not like outsiders coming to fish illegally but do not know what to do. Rangers from LEDET are responsible for apprehending such people. The illegal fishers are uncontrollable because they come at night. Before the dam was extended, the dam was under Matlala and the community and chief were involved in dam activities but because of dam increase 5 metres high, eco-tourism was closed and the community was not involved anymore. The community leadership was not told that they were stopping tourism. The area is under LEDET and because all environmental matters are handled by this department, the leaders do not have any power. With regards to irrigation, they just harvested and are ready for any action if there is a resource they can start.

Sehlo-Kola Aquaculture Cooperative Limited

On the 18th of June, researchers visited Phetwane, the village closest to the dam. A group interview was held with Thebedi Sehlola (chairperson), Elma Molobela (deputy chairperson) and Frank Lekola (secretary). This group is part of a 5-member organization of people comprising Sehlo-kola Aquaculture Cooperative Limited. Although their group was small, respondents explained that, at a meeting that was held at the irrigation scheme building (i.e. premises of Upper Arabie Balemi Irrigation Scheme Cooperative), they had opened invitations to anyone else who wanted to join them. They started thinking of the fishery project prior to the meeting in 2008. On 25 February 2011 the fishers registered the cooperative to show that they

were serious about implementing their plans. They saw the need to form the cooperative after they saw people from Tzaneen and other places in the former Venda homeland visit Flag Boshielo Dam to fish. Such people benefited from natural resources within the local area whilst the local residents did not. So they thought, "Why should we not start a project for community benefit through the charging of fees for access to fishing spots?[23]" Since its establishment, the cooperative had communicated with LEDET and the local municipality. Sehlo-kola had also received support from the aquaculture section of LDA. It would seem that the rationale for aquaculture support by LDA was that the provincial department did not yet have the legal mandate to engage in inland fisheries although the national Department of Agriculture Forestry and Fisheries (DAFF) had already been restructured to include such function. This seems to explain the reason underlying Sehlo-kola's shift away from interests in inland fisheries to interests in aquaculture.

Formal Recreational Anglers

On the 17th of June, researchers spoke to two recreational anglers at Masakane Hardware store in Marble Hall, who were unwilling to be interviewed and to fill in the questionnaire. From the numerous photographs in the shop window (Figure 9), however, one of these appeared to be a keen fisher. This fisher said that for the past 3 years he had reported illegal fishing in the dam, whereby nets were used, and no action had been taken. The other was unwilling to participate in the research for fear of arrest. In overcoming the aforementioned constraint, several key respondents were interviewed and verification was sought from secondary data sources namely, blogs for recreational anglers and other reports.

Figure 9 Masakane Hardware Store, Marble Hall: Some of the photographs showing a recreational angler and his catch

Formal recreational anglers are predominantly white people and often members of angling clubs. These anglers utilize many of the identified popular fishing areas around the dam shore and below the dam wall. They also take part in numerous angling competitions and tournaments that are hosted at the dam each year. Records from angling clubs show that fish species caught on the dam include carp (Common, Mirrors, Grass and Chinese Silver), yellowfish (Large Scale, Small Scale and Papermouth), catfish (Sharp Tooth, Butter and Squeaker), tilapia (Blue, Red Breasted, Rumors of Nile, Vlei and Dwarf), eels (Giant Mottled, African Mottled and Longfin or Black), barbs (Papermouth, 3-spot, tail spot, Silver and Red fin), labeo (Muddies, Red Nosed, Leaden and Purple or Red-scaled), robbers (Dwarf Tiger and Silver), bass (Large mouth and Churchill or Dolphin). Anglers practise catch and release techniques as well take some of their catch home. Prior to the waiver on fishing permits for fishery access via land outside protected areas (and other restricted areas), members of local communities tended to perceive these anglers as having privileged access to fisheries resources, since they had permits which local fishers and anglers did not have.

Views from Informal Fishers and Anglers from Phetwane Rural Community

A number of informal fishers and anglers were interviewed in Phetwane rural community, which is situated closest to and downstream of Flag Boshielo Dam. Findings were that subsistence fishing, formal and

[23] See Section 5.4.1 for rationale of charging outsider for access to fishing spots on Phetwane communal land.

informal recreational angling and illegal small- and large-scale commercial fishing took place in Flag Boshielo Dam. White and black people, particularly males, practice recreational angling. The greater proportion of black male and female fishers practices subsistence, commercial and/or recreational fishing. Women fishers engage in subsistence and small-scale commercially-orientated fishing. The study could not ascertain whether or not any white people are involved, directly or indirectly, in commercial fishing activities. From interviews with informal fishers and anglers, indications were that white 'recreational' fishers tended to release some of the fish and take a portion of their catch home. However, it was not clear whether the latter fish were consumed by anglers' households or sold and/or donated elsewhere.

Various techniques were used to catch fish. These ranged from fishing rods and hand lines to different types of nets. The study did not find any indigenous fishing practices and techniques. However, fishers made use of a variety of innovations, including canoes, rafts and traps made of sisal fibre and other material. The use of canoes and rafts and illegal net fishing by commercially-orientated fishers has become prevalent. Respondents considered that the most dangerous method of fishing is cast netting because it catches all types and sizes of fish and crocodiles die from being tangled in the nets. Local net users fished at night because such practice is illegal and the LDA had security in the form of field rangers who patrolled the dam and the river during the day. Net users from outside local communities also fished during the night, but these often operated from the dam shores and were therefore not easily detected by local community members.

According to respondents, commercial fishers used nets because they could catch a lot of fish for sale in Marble Hall and other towns in Limpopo Province. The smaller net users sold the fish along the roadside and at road intersections. The price of a big tilapia fish (about 20 centimetres long) was around R20. Prices for large silverfish or carp (between 40 and 60cm or more) varied according to the time of day, often ranging from R40 to R60 for a big fish in the morning and early afternoon but reducing to between R20 and R40 towards the evening.

Regarding access to Flag Boshielo Dam, one respondent said that he believed that all dams are state property. However, while people paid to get access to the dam, there was always access through illegal ways, such as where the fence was damaged. In the respondent's view, Schuinsdraai Nature Reserve charged R20 per person and R30 per car per day[24]. There were entrance sites with security near the dam wall and there was another along the road from Marble Hall to the Phetwane turn off. There was a plan for a housing development along the dam. Only wild animals were allowed close to the dam and not domesticated livestock.

With respect to access to riverine fishery resources below Flag Boshielo Dam wall, interviews showed that an earlier perception by Phetwane fishers that their lack of permits renders their activities illegal had given way to an awareness that illegal fishing was catching fish using prohibited techniques, such as nets and traps. This seems to point to the effectiveness of communication and information dissemination by the LEDET environmental compliance and enforcement team. The ecological basis for prohibitions of net fishing and use of traps, however, remained untested. The fact that some local fishers continued to use these methods, despite prohibitions and invitations to join aquaculture projects, indicated that there was a need for studies to determine the ecological characteristics, biological yield and human demand, as well as appropriate stocking and harvesting regimes and techniques.

5.6 Discussion and Conclusion

This report's discussion and conclusion begins by distinguishing between inland fisheries and aquaculture, then proceeds to attempt a characterization of the identified types of subsistence, commercial and recreational fishers, and concludes with a summary and discussion of key issues.

[24] This perception is inaccurate since the correct entrance fees are R25 per angling or fishing interest per day, plus R10 per person per day and/or R20 per vehicle.

5.6.1 Inland Fisheries and Aquaculture

Research findings show that the utilization of fish in and around Flag Boshielo Dam is cast in terms of inland fisheries and aquaculture. Subsistence, commercial and recreational fishing activities take place in the freshwater storage dam and Olifants/Lepelle River downstream. Aquaculture projects, such as Sehlo-kola Aquaculture Cooperative Limited, utilize small 'aqua' dams and/or balancing dams in smallholder irrigation schemes. While the sites for inland fishing and aquaculture are physically separated by distance they are in effect hydrologically linked rather than discrete, with the Flag Boshielo Dam and Olifants/Lepelle River system supplying water to aqua dams and irrigation balancing dams. Furthermore, some of the local people who are involved in aquaculture projects also simultaneously fish from the freshwater storage and river, alongside the majority of subsistence, recreational and commercial fishers and anglers. Although definitions of 'inland fisheries' and 'aquaculture' are perceived by some (e.g. Rana *et al.*, 1998; SADC Protocol on Fisheries[25]) to be interchangeable, owing to their coexistence, shared attributes and inter-linkages, such misconception should not cloud the distinction between the two.

In the context of South Africa, Rouhani & Britz's (2004) distinction is that "aquaculture is the beneficial and sustainable use of water as a medium in which to farm organisms, such as finfish, shellfish and aquatic plants, for example…[and] the definition of aquaculture does not include fisheries, where surplus fish are harvested from populations in extensive water bodies".

According to the FAO (2000 in Smith *et al*., 2005), two aspects that distinguish fisheries from aquaculture (i.e. farming of aquatic resources) are the level of management intervention (i.e. exploitation only) and the ownership of the resource (e.g. open or common property regime). A fishery can therefore be defined as the exploitation of living aquatic resources held in some form of common or open access property regime, where fish account for the bulk of organisms exploited although invertebrates such as crustacea, molluscs and aquatic insects may also be important. By contrast, aquaculture implies a management intervention, such as feeding and private ownership of the stock being farmed. Smith *et al.* (2005) comments that in inland and coastal aquatic systems many forms of aquatic resource use blur this distinction by combining aspects of fisheries and aquaculture. Hence, management interventions may increase yields beyond the level achievable by capture and fishing regulation alone. Such interventions are termed "enhancements" and include, for example, the stocking of seed-fish and habitat creation or restoration. Smith *et al.* (2005) surmises that it is also often possible to establish private access rights to freshwater fisheries.

Drawing from Smith *et al.* (2005) and Rouhani & Britz (2004), among others, this report considers that inland fisheries in and around Flag Boshielo Dam might be considered to include subsistence, commercial and/or recreational exploitation and/or enhancement of a diversity of freshwater fish species held in a common and/or open access property regime. Fishers and informal anglers exploit fish resources in the Olifants/Lepelle River without enhancements. However, the river and dam are part of the same hydrological system and the freshwater fish stocks, which live and spawn in the man-made limnetic Flag Boshielo Dam upstream and migrate to the river downstream, have historically been enhanced through stock supplies from the old hatchery in Marble Hall. Regarding ownership of the resource, the dam is public infrastructure and therefore held in common property. State authorities, such as DWA and LEDET, are responsible for governing access to the dam fisheries. Such responsibilities include the granting of water access rights by DWA, issuing of fishing permits by the delegated Schuinsdraai Nature Reserve and monitoring and enforcement of environmental compliance by LEDET. However, the current prevalence of uncontrolled commercial exploitation of fish resources, using illegal nets and traps as well as irregular points of access to the dam (for example through cuts in the fence rather than formal entrance gates) indicates that, to a certain extent, an informal 'open access' regime currently coexists with the formalized common property regime. Furthermore, the *de facto* emergence of privately-owned and informal large-scale commercial fishing enterprises in Flag Boshielo also suggests that a third property regime, which involves a degree of privatization of fisheries, also coexists with common property and open access regimes.

[25] Rana et al (1998) states that inland fisheries are defined as inland capture plus aquaculture. The SADC Protocol on Fisheries does not provide a definition of the term 'inland fisheries' but clearly defines 'aquaculture' as meaning "all activities aimed at producing in restricted areas, processing and marketing aquatic plants and animals from fresh, brackish or salt waters".

In light of the complexity described above, the challenge for policy interventions will be to navigate the difficult terrain of multi-stakeholder interests and dynamics and build broad stakeholder consensus around the need to craft appropriate institutional arrangements for governing and managing inland fisheries associated with Flag Boshielo Dam. The need to ensure that dam fisheries contribute to enhancing rural livelihoods and thus reduce embedded poverty and unemployment will require particular attention to be given to issues of access rights, stakeholder power dynamics, among others. Socio-economic, sociopolitical, and political-economic issues, which are often termed the "soft issues" (as opposed to the "hard" or natural science issues) are likely to require exceptional levels of inventiveness from those tasked with formulating, facilitating and implementing new institutional arrangements for inland fisheries.

5.6.2 Flag Boshielo Dam Fisheries: Typology of Subsistence, Commercial and Recreational Fishing Practices and Techniques

In a rapid appraisal of water sources and uses in 15 villages in Upper, Middle and Lower Arabie Irrigation Scheme communities and in-depth empirical research in Phetwane community in 2008, Tapela (2009) found that the issue of informal fishing emerged in varying degrees of importance in most of the communities. Fishing was more important as a means of livelihood, subsistence, survival and recreation, particularly for the poor, unemployed and landless local people in communities closest to the dam than for those located further downstream. Only one informal small-scale commercial fisher was identified in the community closest to the dam. Formal recreational angling and informal commercial fishing activities closest to the dam, however, were largely the preserve of more affluent people from outside local rural communities. The PLAAS researcher identified roughly six categories of fishers and anglers, which can be used to supplement findings by this study.

These categories were survivalist subsistence fishers, livelihoods-orientated subsistence fishers, informal recreational anglers, locally-based resource-poor commercially-orientated fishers, externally-based large-scale commercial fishers and externally-based formal recreational anglers. Most of the fishers were of male gender, but subsistence fishers included a few women, who were very poor, fished for food security and either headed their households or were reportedly neglected or under-supported by spouses working in urban centres further afield, such as in Gauteng Province and Polokwane. Drawing from Tapela (2009) and this study's findings above, the following sub-sections present characterizations of subsistence, commercial and recreational fishers, fishing practices and techniques around Flag Boshielo Dam.

Figure 10 Survivalist subsistence fisher with her catch

Survivalist Subsistence Fishers

Survivalist subsistence fishers (Figure 10) are mostly the poorest among male and female members of Phetwane community, who use hand lines, fish traps made of sisal fibre and plastic netting, and rudimentary home-made rods with basic tackle, such as twine and hooks, to catch mostly small fish for their own consumption. The women (and children) fish further away from the fishing spots immediately below the dam wall, which are dominated by men. A few of the men fish in fishing spots close to those of women. These fishers mostly fish for food security, principally to supplement their household requirements for protein. Although some of the women are recipients of child supports grants, they have no other sources of income and can therefore not afford the cost of meat sources of protein, such as beef and chicken.

Livelihoods-Orientated Subsistence Fishers

Livelihoods-orientated subsistence fishers are mostly unemployed and/or landless Phetwane men, who practise fishing as a livelihood. The fishers report that they mostly catch tilapia (or bream) and carpenter or silver fish, among other species. They sell surplus catch along the roadside and take the rest home either to eat or to sell or donate to other members of the local community. They sell the larger fish, which weighs up to 3kg for carpenter or silver fish and between 450g and 2kg for tilapia. These fishers own fishing rods, hand lines and hooks, which are purchased from retail outlets in the small town of Marble Hall. However, they clearly state that their fishing tackle reflects their lack of financial resources to buy adequate equipment for catching the large fish found in the dam. They also state that their knowledge of correct fishing techniques is inferior to that possessed by externally-based recreational anglers, whom they often observe and interact with. Some of these fishers express no interest to be allowed access into Flag Boshielo Dam, but seem content with fishing below the dam wall, where they do not pay any entrance fees. Their only concerns are the risk of crocodile attacks, since the river banks are covered with vegetation overgrowth, and overfishing by commercial fishers from outside local communities.

Informal Recreational Anglers

Informal recreational anglers are people from local communities, who practice angling as a sport and pastime and are not affiliated to any angling clubs and associations. They use store-purchased and home-made fishing rods, hooks and bait. During day time, they frequently angle from fishing spots below Flag Boshielo Dam wall, alongside subsistence fishers but not commercially-orientated fishers, whose activities are said to be largely conducted at night. Some of the informal recreational anglers also use fishing spots along the dam shore and they pay entrance fees to gain access to the fishery.

Many of the informal recreational anglers take their catch home and some release the small fish back into the water. However, they take fish home not because they critically need to survive or subsist on it, but as a sort of 'reward' for a day spent in the outdoors. Like the livelihoods-orientated subsistence fishers, informal recreational anglers express a concern that they lacked adequate knowledge of correct catch-and-release techniques. They are concerned that some of the fish that they release eventually die due to injury.

A number of these anglers also voice a desire to own appropriate fishing gear and tackle, but have no financial means and insufficient knowledge. They also voice their vision to establish a recreational fishing-cum-picnic site on land adjacent to fishing spots below the dam wall and thereby generate revenue for developing their communities. Towards realization of this vision, informal recreational anglers state that they realize that they will need to obtain permission from traditional leadership to use land close to the dam wall and river. Other major challenges they face are the lack of clarity about the appropriate government department to approach for technical assistance and funding for such a project.

Small-Scale Commercially-Orientated Fishers

Small-scale commercially-orientated fishers are largely resource-poor and unemployed men and women from rural local communities around the dam. It is not clear to what extent landlessness, which is rife, contributes to the ranks of these fishers. The fishers use various types of nets, including beach seine nets, gill nets and other home-made nets. Some of the fishers use both nets and fish traps, as well as canoes and rafts. Both men and women fishers are involved in illegal net fishing practice. While seine nets are mostly used by men, women fishers often use bunched up dry sisal cords, which they put into the water to trap fish. Small-scale commercially-orientated net fishers rely on informal markets along local roadsides, at road intersections and within local communities.

While this study finds that there is currently a prevalence of "poaching" or net fishing activities by resource-poor commercially orientated fishers from local communities around the dam, Tapela (2009) in 2008 identified only one such fisher from Phetwane community. Characterization of this fisher was that he conducted his fishing activities alone at night and brought home large catches of fish, which he sold within the community and in Marble Hall. Members of the community were reluctant to mention the fishing techniques used by the fisher, save that he caught significantly more fish during his night time activities than all anglers did during daytime, and that he was earning significantly large income from selling fish.

Findings by this study are that small-scale commercially-orientated net fishers constantly try to evade being apprehended by the LEDET environmental compliance and enforcement team, which patrols both the dam shore and river. Although LEDET's Community Outreach Programme has elicited the cooperation of local people in the apprehension of net fishers from outside rural communities close to the dam, it is not clear to what extent local people also report illegal net fishing by members of their own communities. Also not clear is the degree to which local people continue to collaborate with larger commercial fishers from further afield. Consequently it is also not clear whether or not the current endemic activities by small-scale commercially orientated fishers relative to fewer reports of such activities in 2008 indicates an increase in prevalence or simply an increase in the visibility of this practice.

Commercial Fishers

The term 'commercial fisher' in this case study report is used specifically to refer to the relative size of operation within the context of Flag Boshielo Dam. The report acknowledges that large scale in this context might constitute a different and perhaps smaller scale in other inland fisheries contexts within South Africa and elsewhere. In Flag Boshielo Dam, large-scale commercial fishers are mostly male 'outsiders', who live in places far away from dam and are either more affluent or better resourced than small-scale commercial fishers. They use highly specialized line fishing, often with up to 5 to 6 large nets of lengths up to 500m. They use boats and rapidly assembled rafts, the latter being a means of evading detection.

The larger commercial fishers reportedly fish from all formal and informal access points, namely private farms, DWA premises, Schuinsdraai Nature Reserve, Matlala Aloe Park and the riverine pools immediately below the dam wall and next to Phetwane Irrigation Scheme. These fishers camp by the dam shore or river banks for between one and several days and rent space and electricity for their chest freezers. They formally source fishery access, camping facilities and electricity and other services from registered fishing camps, such as Matlala Aloe Park, and eco-tourism resorts, such as Schuinsdraai Nature Reserve and private farm lodges. Those fishers utilising the pools below the dam wall reportedly make informal arrangements to "plug" their electrical deep freezers in homes of members of Phetwane community. They pay agreed amounts for the use of electricity and space in these homes.

After fishing, the commercial fishers transport their catch in bakkies or four-wheel drive vehicles urban markets that are more distant than Marble Hall, which is the urban domain of some among locally-based small-scale commercially-orientated fishers. Such urban markets include larger towns, such as Tzaneen, Polokwane, Phalaborwa and Groblersdal, in Limpopo Province. Given that, when apprehended, these fishers are caught with up to 5 to 6 nets that are 500m long and catch between 400 and 500 fish each, the gross profit margins of large scale commercial farming need to be examined. Such an examination, combined with the examination of ecological characteristics, biological yield and human demand, as well as appropriate stocking and harvesting regimes and techniques, will help to determine the options for sustainably developing Flag Boshielo Dam fishery.

Formal Recreational Anglers

Formal recreational anglers are mostly white people, who are members of angling clubs and associations. These anglers utilize many of the identified popular fishing areas around the dam shore. They also take part in numerous angling competitions and tournaments that are hosted at the dam each year. These recreational anglers come from areas ranging from local farms and towns, such as Marble Hall and Groblersdal, to places much further afield, such as Tzaneen, Louis Trichardt, Polokwane, Phalaborwa and elsewhere within and outside of Limpopo Province. Historically, formal recreational anglers have had greater formal access to Flag Boshielo Dam fishery, through fishing permits, than members of rural local communities.

These anglers are better resourced than informal recreational anglers from rural local communities. They have better fishing gear and tackle, such as boats and flotillas, expensive fishing rods and specialized lures, among other forms of gear and tackle. They possess "expensive" related resources such as vehicles, boat-trailers, freezers, caravans, tents, gas appliances and outdoor furniture. Formal recreational anglers also have the financial resources to stay in formally registered resorts and camps, where there is greater security, electricity, water, ablutions and other facilities. They are considered by local anglers to have better

knowledge of fishing techniques. They practice catch-and-release techniques, often releasing some of the fish and taking a portion of their catch home. However, it is not clear to what extent recreational anglers consume, sell and/or donate their catch.

5.6.3 Shifts from 'Indigenous' to Current Fishing Practices and Techniques: Overview

Within the case study area, the history of rural people's inland fishing activities pre-dates the development of Flag Boshielo Dam, when local people fished in the Olifants/Lepelle River. However, with dam development and social transition over time, traditional fishing practices and techniques, such as the *sefo* 'basket' trap and the nets made from *modibo* tree branches, have since disappeared, while newer subsistence, recreational and commercial fishing practices and techniques emerged.

Earlier versions of the newer fishing practices and techniques include the use of gear and tackle that combines locally available natural resources and store-bought man-made raw material. An example is *lehlaka*, which is a rudimentary home-made fishing rod made of a combination of reeds cut from river banks and lines purchased from stores in Marble Hall. Such hybrid forms still prevail particularly among resource-poor survivalist and livelihoods-orientated subsistence fishers from local communities. However, the fact that these fishers commonly express aspirations to own store-bought fishing rods, for example, seems to suggest that the hybrid forms are being gradually replaced by the more modern 'ready-made' forms. Indeed, this study's research findings show a greater visibility of store-bought fishing rods, lines and hooks than of forms such as *lehlaka*. However, further in-depth studies are required to determine definitively the current coexistence of the earlier and later forms of gear and tackle.

Apart from the ready-made fishing rods mentioned above, later versions of the newer fishing practices and techniques currently also include the use of store-bought hand lines, hooks, seine nets, gill nets and other nets, boats, canoes and flotillas, among others. Such gear and tackle currently coexists with the more recently emerged informal 'self-help' types of innovation by fishers who eke livelihoods and/or operate informal commercial enterprises outside the ambit of existing laws. These self-help types of innovation include the metal-and-sisal rafts, which are cheaper, rapidly assembled on site and increasingly used by commercially-orientated male and female net fishers. The innovations also include the sisal and plastic fibre traps, which are mainly used by local female subsistence fishers.

Regarding types of inland fisheries, traditional subsistence-orientated fisheries have over time become diversified to include newer subsistence, commercial and recreational fisheries. Exploitation has also broadened to include both local people and outsiders. Such shifts possibly mean that the search for appropriate local institutional arrangements for the governance and management of Flag Boshielo fishery will be a more complex undertaking than afforded by conventional top-down, techno-centrist conservation approaches. Challenges might be linked to a combination of factors, including the erosion of traditional (or indigenous) institutions, knowledge systems and resource management and exploitation practices; insufficient knowledge of current fishing practices and techniques as well as requisite management regimes and governance system; lack of clarity on the requisite structure of access rights; power dynamics amid the diversity of stakeholder interests; and the emergence of predatory forms of uncontrolled resource exploitation. In light of these, there is a need to avoid romanticist notions that a reversion to embedded traditional resource management and governance systems will be effective. In any case, levels of social cohesion in many rural communities around the dam show some degree of fracturing due to the historical processes by which these communities were constituted and on-going the impacts of the broader economic, social and political milieu. Options might need to be explored through more innovative ways, such as broad stakeholder consultations, negotiations, conflict resolution and other means.

5.7 Discussion and Conclusions

Research findings show that Flag Boshielo is used by various categories of subsistence, commercial and recreational fishers and anglers. Subsistence and commercially-orientated fishers are predominantly black men and women while recreational anglers are mostly white males and to a lesser extent black men. Among fishers from local communities, many of the resource-poor subsistence and recreational

fishers tend to restrict their fishing activities to informal fishing spots below the dam wall and along Olifants/Lepelle River. Exceptions to this are the illegal net users, the more affluent among informal recreational anglers and possibly subsistence fishers who enter the dam area through irregular points, such as cuts through the fence.

Findings also show that earlier perceptions of exclusion due to racial discrimination have since given way to an awareness that direct access to fishery resources in the dam is both a socio-economic class question of who possesses what financial resources to pay for access and a 'livelihood strategy' question of who possesses what gumption to claim *de facto* access through irregular or illegal means.

All stakeholders interviewed consider that illegal net fishing by large informal commercial operators from outside local communities poses the greatest threat to the sustainability of the fishery. With respect to access to riverine fishery resources below Flag Boshielo Dam wall, interviews clearly show that an earlier perception by local fishers that their lack of permits renders their activities illegal has given way to an awareness that illegal fishing is catching fish using prohibited techniques, such as nets and traps, and practices, such as surreptitiously accessing the dam area through breaches in the fence. Such awareness possibly points to the effectiveness of LEDET's Community Outreach Programme, particularly the communication and information dissemination by the environmental compliance and enforcement team that is based close to the dam. However, the ecological basis for prohibitions of net fishing and use of traps remains untested. There is a need for studies to determine the ecological characteristics, biological yield and human demand, as well as appropriate stocking and harvesting regimes and techniques.

Although LEDET's Community Outreach Programme has elicited the cooperation of local people in the apprehension of net fishers from outside rural communities close to the dam, it is not clear to what extent local people also report illegal net fishing by members of their own communities. Also not clear is the degree to which local people continue to collaborate with larger commercial fishers from outside their communities. Consequently it is also not clear whether or not the current endemic activities by small-scale commercially orientated fishers relative to fewer reports of such activities in 2008 indicates an increase in prevalence or simply an increase in the visibility of this practice.

Despite the commendable achievements by LEDET's Community Outreach initiative, the persistence of local perceptions that illegal fishing practices and techniques are legitimate when used by their own fellow community members but not by outsiders suggest that there might still remain among members of local communities unresolved questions about the legitimacy of prohibitions to net and trap fishing techniques. Such questions necessarily have to be seen in light of unresolved socio-economic and environmental issues around compensation and benefit sharing for rural local communities, which date back to the time of dam construction. Rural local communities around Flag Boshielo Dam have historically been excluded from access to the dam while paying the costs associated with dam development and with continuing to live in close proximity to the dam. Such questions should also be examined in context of the endemic poverty, unemployment, landlessness and marginalization within these communities, whereby Flag Boshielo fishery is in effect a critical safety net for survival and a source of subsistence, livelihood, income and recreation. While further research is required to develop clearer understandings of the contextual issues underlying illegal fishing activities by local people, the mere fact that there has been a growing sense of despondency in Upper, Middle and Lower Arabie rural communities about government's capacity to resolve rural people's challenges (Tapela, 2009) means that interventions imperatively have to explore ways of ensuring that local people derive meaningful benefits from local inland fisheries.

Without detracting from the importance of the governance issues mentioned above, it seems critically important to halt the possible decimation of Flag Boshielo Dam fishery by uncontrolled large-scale commercial fishers. Although ecological characteristics, biological yield and human demand, and appropriate stocking and harvesting regimes and techniques of the Flag Boshielo Dam fishery have yet to be fully understood, the 'precautionary principle' might have to be applied to safeguard against possible negative impacts of rampant exploitation.

However, biological, ecological and social aspects of fishery management alone will not be able to halt uncontrolled exploitation. There is also a need to gain clearer understandings of the economic drivers of large-scale commercial fishing in Flag Boshielo. Understandings of fishery value chains will be critical, since gross profit margins associated with this practice implicitly seem to be high. The large commercial fishers make significant investments in fishing gear and tackle (up to 5 to 6 nets that are 500m long) and related resources (bakkies, 4x4 vehicles, tents, caravans, deep freezers, rented accommodation, etcetera), travel long distances (between 300 and 400km) and catch between 400 and 500 fish per net for between one and several days per trip. It does not seem feasible that such levels of investment could be made without viable financial returns. Without clearer understandings of the economic drivers and value chains associated with large-scale commercial fishing activities, interventions to sustainably develop the Flag Boshielo Dam fishery and to contribute to enhancing rural livelihoods are unlikely to succeed.

In the final analysis, however, the sustainability of inland fisheries, such as Flag Boshielo, will be determined by the extent to which such fisheries contribute to meaningful enhancements of local livelihoods, capacities, equity and well-being. Definition of what constitutes 'meaningful' benefits will require shifts away from conventional top-down technicist approaches towards more active forms of participation by local communities in stakeholder engagement processes. The fact that most of the local anglers and fishers continue to utilize inland fisheries despite invitations to join aquaculture projects suggests the need to understand and possibly accommodate the tenable interests of local fishers and anglers, while simultaneously managing outstanding historical and current socio-economic, environmental and political-economic issues around cost-and-benefit sharing, compensation and participation.

Given the pervasive poverty, unemployment and landlessness in rural local communities, it seems necessary that in exploring possibilities of sustainably developing, managing and using subsistence, recreational and/ or commercial fisheries in and around Flag Boshielo Dam, a constant objective for interventions should be to contribute to enhancing rural people's livelihoods. Findings that most of the livelihoods-orientated subsistence fishers express no interest to be allowed access into Flag Boshielo Dam but seem content with fishing below the dam wall suggests that options for sustainable fishery development might be broader than questions of equitable access to fish in the dam. This suggests therefore that, in addition to considerations of existing fishing practices, interventions might also explore possibilities of ensuring that members of local communities derive economic benefits from fishery-related enterprises. Such enterprises could include recreational eco-tourism, fish processing, fish marketing and associated agglomeration economies. Particular attention needs to be given to women fishers, who are mostly poor and for whom access to fishery resources provides a critical safety net. It is imperative that the needs of this particular group of primary stakeholders should be given particular attention, since these rural women have limited power and influence and their voices are seldom heard.

Expressed concerns about the need for clear guidelines on catch sizes, as well as the implicit questioning by local people of the legitimacy of prohibitions to the use of fish nets and traps iterate the need to complement understandings of current subsistence, recreational and commercial fishing practices and techniques with better understandings of the ecological and biological characteristics of the fishery. Such knowledge will contribute to the development of clearer stocking and harvesting regimes and appropriate fishing practices and techniques.

Concerns about the lack of clear regulations regarding the selling of fish from the roadside perhaps need to be addressed within broader stakeholder platforms, which include consumers, scientists and regulatory authorities. A requisite objective of such consultation would seem to be to find acceptable ways of rallying the diverse interests of different stakeholders around a commonly shared interest, for example the need for hygienic handling of fish. Ultimately, the achievement of consultation objectives around this issue should be measured in terms of the degree to which institutional responses enhance the well-being of fish sellers, who derive livelihoods from informal fish markets, consumers, who benefit from easy access to fresh fish, and the public in general.

From a livelihoods perspective, concerns about risks of crocodile attacks need to be addressed, from a human safety perspective and not simply a conservationist point of view. Some of the women fishers in and

around Flag Boshielo Dam are observed to catch fish while simultaneously attending to their children. Many of the local male fishers catch fish in deep pools below the dam wall and on river banks that are overgrown and therefore risky. If local fisher's interests to develop recreational fishing spots and picnic sites in communal lands below the dam wall prevail, there might be even greater exposure to risk unless precautionary measures are adopted. The crocodile risk issue should be seen not only from a fishing perspective but also from the view that local communities utilize local water sources for a range of other uses. Fishing activities are often part of rural people's 'baskets' of livelihood strategies. In communities where households have poor access to water, women and girls fetch water for household use, irrigation of riverside gardens and clay pottery making from the crocodile infested river (Tapela, 2009). In essence, therefore, fishery resources should be seen as closely linked to rural livelihoods and interventions thereby crafted to reflect such linkage.

5.8 References and Bibliography

Dill, W.A. 1990. Inland fisheries of Europe. EIFAC Technical Paper. No. 52. Rome, FAO. 1990. Internet (***www.fao.org***) 15 September 2011.

Ephraim Mogale Local Municipality Integrated Development Plan 2011/2016, Final Draft.

Ephraim Mogale Local Municipality Annual Report (July 2009- June 2010), 2011. Retrieved on 18 July from ***http://ephraimmogalelm.gov.za/annualreport.pdf***

Makhubele, S (2011) LEDET Permits Officer, personal communication, 09 September 2011.

Rana K.J., Grainger, R. & andCrispoldi-Hotta, A. 1998. Current Methods and Constraints for Monitoring Production from Inland Capture Fisheries and Aquaculture. Paper presented at the FAO/DFID Expert Consultation on Inland Fishery Enhancements, held in Dhaka, Bangladesh, on 7 to 11 April 1997. FAO Fisheries Technical Paper No. 374. Rome: FAO. (Internet: ***www.fao.org***) 15 September 2011.

SADC Protocol on Fisheries. Internet (***http://www.sadc.int/index/browse/page/150#1***) 15 September 2011.

Sekhukhune IDP Budget, 2011.

Smith, L. E. D, Nguyenkhoa, S and Lorenzen, K. 2005. Livelihood functions of inland fisheries: Policy implications in developing countries. Water Policy 7 359-383.

Situational Analysis, Greater Marble Hall Local Municipality, 2007. Retrieved on 11 July 2011 from ***http://www.ewisa.co.za/eWISAWaterworks/misc/MunicipalDocuments/LimDisGreater_Sekhukhune/LMGreater_Marble_Hall/MARBLEHALL_SITUATIONAL_ANALYSIS.pdf***

http://www.info.gov.za/view/DownloadFileAction?id=64862. Accessed 18 July 2011

http://www.sahistory.org.za/people/marutle-flag-boshielo. Accessed 6 July 2011

http://www.wildliferesorts.org/limpopo-resorts/sekhukhune/tambotie-ridge-lodge.html. Accessed on 18 July 2011

Tapela, B. N. 2008. Report on Livelihoods and Agricultural Commercialization in Phetwane Smallholder Irrigation Scheme. Unpublished PLAAS doctoral research report.

Tapela, B. N. 2009a. *Water Rights in Informal Economies: Report Two on A Case Study of Phetwane Community in Limpopo Province of South Africa.* Second of four research reports produced under the South African Component of the Consultative Group for International Agricultural Research (CGIAR) Challenge Programme for Water and Food (Project 66).

Tapela, B. N. 2009b. *Water Rights in Informal Economies: Report Three on A Case Study of Upper, Middle and Lower Arabie Communities in Limpopo Province of South Africa.* Third of four research reports produced under the South African Component of the Consultative Group for International Agricultural Research (CGIAR) Challenge Programme for Water and Food (Project 66).

Weyl, O. L. F, Potts, W. M, Rouhani Q and Britz, P. 2007. The need for an inland fisheries policy in South Africa: a case study on the Northwest Province. *Water SA* 33: 497-504.

6 NANDONI DAM, LIMPOPO PROVINCE

Figure 11 Subsistence fisher, Nandoni Dam

6.1 Introduction

A field survey of fishing activities in Nandoni Dam and surrounding villages, particularly Ha-Budeli, was conducted from 25 to 26th March 2011. Research was conducted by UWC Honours student, Ms Rozwivhona Magoba, with the assistance of Mr Attorney Hlongwane. Researchers sought to obtain useful qualitative and quantitative insights through appraisals of fishers and rural fishing communities. Due to envisaged and on-going institutional processes around South African inland fisheries, the researchers conducted research as unobtrusively as possible as a means to avoid raising undue expectations.

6.2 Methodology

The field survey was conducted through rapid appraisals of fishers and the rural fishing community of the Budeli village. The survey was undertaken over two days, one a weekday and the other a weekend day. This was done in order to capture the views of a diversity of fishers, some of whom were said to fish on weekdays and while others only fished during weekends. Firstly, information was collected through interviews with individuals who are renowned fishers within the community together, whether or not such fishers were actively catching fish at the time of the survey. Secondly, data was collected through interviews of other fishers found fishing in the dam at the time of the survey. Thirdly, a few households, whose members were fishers, fish sellers and/or fish consumers were interviewed, in order to get a sense of the gendered demographic and livelihood profiles and linkages to fishing of households living close to Nandoni Dam fishery. Fourthly, interviews were conducted with the some of the community elders and the local chief. Secondary data was also collected from key resource persons, who had expertise and knowledge about

fishing practices and techniques and management and governance arrangements for Nandoni Dam fishery (or lack thereof). Semi-structured lists of interview questions were drawn up and administered to the fishers directly. Such questions were structured in order to capture fishers' socioeconomic profiles, including variables such as age, gender, household composition, socio-economic characterization, employment status and monthly income levels.

The researchers made a conscious effort to comply with ethical guidelines regarding community entry and social research in Ha-Budeli rural community. Prior to research, the research assistant approached a community elder from Ha-Budeli Village, Mr Baloyi, for assistance with permission to access the study site and to get information from the members of the community. This elder then introduced researchers to the *headwoman* of the village, who was aged between 60 to 70 years old (Figure 12). The researcher and the assistant then entered the chief's palace and explained the purpose of the research and also asked for permission to interview the villagers of Ha-Budeli and fishers at Nandoni Dam. They also explained the aim of the research and kinds of questions to be asked. Permission was granted with no difficulty and researchers were welcomed with "an open heart and peace", according to the chief. Furthermore, the chief played a crucial role in organizing some known elders of the community, who then provided information about the fishing activities in Nandoni dam. Beyond compliance with ethical guidelines for social research in rural communities, the act of requesting permission from the chief represents a form of respect and compliance with traditional protocols.

Figure 12 Nandoni: Headwoman of Ha-Budeli Community

During the field survey, all respondents were briefed about the importance of the study before any questioning and, where possible, permission was obtained before photographs were taken. During questioning respondents were also asked whether or not they consented to the publication of their names and/or whether they preferred to remain anonymous. A few challenges were experienced though throughout conducting the survey, some of the interviewees were not comfortable with giving out their names, ages and having their photos taken, in such cases code names were given with age assumptions used to categorise them in different age groups and they were not forced into revealing anything they wouldn't want to.

6.3 Background to the Study Area

6.3.1 Location

Nandoni Dam which was previously known as the Mutoti Dam is situated in the Limpopo Province, 12km away from Thohoyandou, is surrounded by six small rural communities namely: Budeli, Mutoti, Tshiulungoma, Mulenzhe, Dididi and Pitiboyi. It falls under the Vhembe District in the Thohoyandou-based Thulamela Local Municipality. The dam was completed in 2005 and has a height and a crest length of 43 and 2215 meters respectively. It has a total catchment area is 1380 square kilometers (km²), covering a surface area of 1570 hectares (ha). The main purpose for building a dam was for water supply to the communities and has a capacity of 164 million cubic meters[26]. This dam is mainly impounded by the Luvuvhu River and the Greater Letaba River.

6.3.2 Socioeconomic Profile

The rural area around Nandoni Dam is provided with secondary, primary and a preschool (crèche) educational services are being provided to the community, a are available to be used by the public, but has no primary healthcare service (i.e. clinic). Water supply services are poor. Although communities have street water taps, these have lately been dry, thus compelling villagers to go to the dam to collect water

[26] Source: ***www.dwa.gov.za***, list of dams, 1998

for all household uses. Sometimes a truck brings water to Ha-Budeli Community. One of the respondents complained about the fact that they have a dam full of water within their land but such water is being supplied to towns elsewhere, such as Makhado and Thohoyandou, while rural communities around the dam lack secure access to potable water.

Overall, most of villages around Nandoni Dam do not have secure access to water and sanitation, and percentages of the population with sanitation below RDP levels are shown to be higher. The lack of sanitation in this area leaves a most of the people having to use pit latrines, which are not sealed. They look for the cheapest and simplest possible way to have a toilet in their yard. This might, with time, lead to groundwater contamination since the water table might too shallow especially for households located closest to the dam.

6.4 History and Management of Inland Fishery

According to the DWA List of South African dams, the dam was completed in the year 2005 and was officially registered on the 15th November 2005. It was designed and constructed by the Department of Water Affairs and Forestry (DWAF), the dam is currently under the management and ownership of the Department of Water Affairs (DWA) has control over it. The communal land which surrounds the dam is under the control of the respective local chiefs.

It was said by one of the elders during the discussions that, a serious drought had stricken Venda during the late 80's, and consequently drinking water had to be delivered to communities by tankers for a long time. The Department of Water Affairs then started investigating other safe reliable ways of providing water to the region which resulted in the Nandoni Dam bring constructed.

Access to fisheries is not controlled in this area. No collecting permit/fishing license is currently required in to fish in the dam and there are no regulations to control fishing activities. However, children under 14 years are not allowed. Villagers confirmed that the dam had not been handed over to the community and was currently owned by the Department of Water Affairs but which is said to have not done anything to monitor and regulate fishing activities. The villagers though share equal privileges on sharing the dam. No one has better or more rights than the other (equality); though some of the chiefs around the dam were reported to sometimes not allow or chase away people who come for fishing.

6.5 Characterization of Indigenous Knowledge and Current Fishing Practices and Techniques

6.5.1 Findings From Key Stakeholder Organisations

University Of Venda

Professor Ben Van Der Waal of the University of Venda expressed concerns about the way fisheries are neglected in South Africa, as compared to other countries. This was evident especially in cases where fishing was practised as means of subsistence and livelihoods. The academic also expressed concerns about illegal fishing activities and cited the prevalent use of nets as a method for fishing. Such a practice needed to be curbed, especially in inland fisheries. He further reasoned that since everyone turns a blind eye to inland fisheries, this leads to poor management of resources.

According to Fouche *et al.* (2010), Nandoni Dam is ecologically in entering a maturation phase. Hence, the increased fishery productivity observed during the initial two phases of the dam's existence would soon peak and drop to constant levels, with the normally expected fluctuations. During field surveys that he conducted from September to November 2009 and again from January to November 2010, twelve (12) species were collected using nets. These showed that *Schilbe intermedius* was the most abundant at more than 74 % of the total catch, followed by *Oreochromis mossambicus* at close on 19 % and *Labeobarbus marequensis* at just 2 over 3.5%. A total number of 2350 specimens were collected and *Schilbe intermedius* had dominated at all the sites.

Species that were found in the Dam during the survey undertaken by Fouche (2010) included: *Barbus trimaculatus; Barbus viviparous; Clarias gariepinus; Labeo cylindricus; Labeobarbus marequensis; Labeo molybdinus; Marcusenius macrolepidotus; Micropterus salmoides; Oreochromis mossambicus; Schilbe intermedius; Synodontis zambezensis; and Tilapia rendalli.*

6.5.2 Findings from Rapid Appraisals of Fishers and Local Key Respondents

Key Respondent: Village Elder

A highly esteemed elder of the village, stated that Nandoni Dam was built on Luvhuvu River and its construction affected many communities, such as Mulenzhe, Dididi, Tshilungoma and Ha- Budeli.. Other communities, such as those situated on the eastern side of the dam, were indirectly affected through effects of stream flow reduction. The dam was controlled by the Department of Water Affairs and no chief or headman had power to control. Some chiefs or headmen were trying to control Nandoni Dam by allowing developments on the already purchased land. The dam was not officially handed over by the department and the municipality had little power over the dam. The DWA had all the powers over the dam and they ended up abusing the rights of the communities residing next to it.

Community concerns included 'outstanding social issues' associated with dam construction, particularly dissatisfaction with inadequate or no compensation for losses incurred by some of the displaced people, whose crop fields and orchards were covered with water. Other losses included loss of agricultural production, infrastructure and lack of secure access to the dam, among others. Loss of rights of access to arable land accounted for increased levels of fishing activities. A major part of the problem was that there was no written agreement of the compensation amount between rural communities and the government and the matter was being handled by the Public Protector. However, government and the communities were negotiating a solution to the problem[27].

Focus Group Discussion and Field Survey with Villager Elders

Respondents confirmed that the dam had not been handed over to the community and was currently owned by DWA. However, DWA did not do anything to monitor and regulate fishing activities. The village elders reported that there was a record of about ten (10) people who died while fishing in the dam, most of who were using boats and nets. Respondents said that there are crocodiles in the dam, although these are rare to find. Crocodiles are often seen in areas near Tshiulungoma Village since there are a lot of open crop fields close to the dam, where the reptiles could burrow, lay their eggs and make hiding places. By contrast, the dam shore area near Ha-Budeli Village is rocky and vegetation has almost been completely cleared.

Field observation, through a walk with the elders along the dam shoreline, revealed a few small dead fish in the dam. Observed uses of the Nandoni Dam included washing of clothes, bathing, drinking for domestic animal and collecting water for different house requirements except for drinking, since Budeli village possesses street water taps that supply sufficient water for drinking and cooking purposes. Researchers witnessed a men bathing in the dam and women washing their clothing during the site visit.

Interview with Local Male Fishers

On 25 March 2011, researchers visited fishing spots along Nandoni Dam shore and interviewed a few of the regular fishers.

An 18 year old fisher from Ha-Budeli Village (Figure 13) said that he sold his catch by the road side close to the dam and in the town of Thohoyandou. He earned between R500 and R2000 per day. He preferred fishing during the evening, from 5pm – 8pm and sold the fish in the following morning from 6 – 10am. Sometimes he caught more than he could handle alone and therefore employed some people to assist selling his catch in nearby towns and other roadsides, thus generating up to R2500 a day altogether. A 25

[27] Interview findings largely confirmed by article entitled 'Dam construction negatively affects communities', published in the Official Newsletter Of The Public protector, Volume 1 2010 (November), page 3. Internet [***http://www.pprotect.org/news/PP%20Newsletter1.pdf***], 08/08/2011.

Figure 13 A regular subsistence fisher in Nandoni Dam

litre bucket of fish cost R250.00, and the pricing of individual fish depend on the size of the fish. Small fishes (<7cm) were released immediately when caught. Sometimes, fish were dried and sold later. His household was comprised of 4 people and none of them had a permanent job. However, they did not depend entirely on fishing for a living. For example, his mother was a street vendor and sold vegetables at a market in the town of Thohoyandou.

Other fishers reported that they used *Mambule* (casting nets) and *Tshinjovho* (fishing rods). They confirmed that the best time to catch fish was immediately after sundown, when it was getting dark, because it helps the fishermen to stalk without the fish noticing them and thus escaping to deeper waters. However, they preferred to cast nets between 0800 and 1100hrs in the morning and fishing rods during the afternoon. They used both paddled and automated boats in the dam. Respondents also reported that most of the people who fish are jobless, some having never been employed and others having been retrenched. However, a number of local fishers do so for fun and recreation. Respondents further stated that no fishing permit or license is currently required to fish in the dam and there are no regulations to control fishing activities. However, local rules are that children under fourteen (14) years are not allowed to fish, for safety reasons. Respondents also generally considered that there were no established 'clean-ups' (i.e. picking up of litter and maintenance of cleanliness) and safety precautions around the dam. The fishers openly said that headman of Pitiboy Village on the other side of the dam was the main problem. They told the research team that he would confiscate their fish, boats, rods and nets and burn them. He sometimes called the policemen and rangers from LEDET's Environmental

Figure 14 Nandoni Dam: Subsistence fisher Munyai using earthworms as bait

Compliance and Enforcement Section to come and take the fisher's nets without first talking to them, but rangers did not bother them anymore. Fishers disclosed that crocodiles do not give them problems because they eat a lot of fish. They told the team that one fisherman had drowned in the water while he was removing some fish from his nets.

Another local fisher did not have proper fishing rods with which he could use to fish deep inside to catch bigger fish (Figure 14). He used one fishing rod tied on to the reel. He fished three times a week, using earthworms as bait, when he was not self-employed or when he was bored and needed some recreation. He told the researchers that both males and females can fish. He said swimming was not allowed as some people had drowned in the past. As a fisherman, the fisher personally did not have problems with sharing Nandoni Dam with outsiders but was concerned that fishers steal each other's nets. He told the research team that he felt free fishing while standing inside the dam as long as the water was clear and he could see where he was standing. Regarding local rules of access to the dam, children aged under 12 years are not allowed to come alone to the dam and it was every one's responsibility to tell them to go home if they go close to the dam. However, researchers spotted some young boys in the dam using casting nets to fish. Some huge nets were also seen inside the dam, and these had purportedly been left behind by their owners and would be collected later on when the fish had been caught.

Interviews with Members of Households In Ha-Budeli Village

General views by interviewed members of Ha-Budeli households were that many people do not fish at Ha-Budeli anymore. Most fishers had moved to Tshiulungoma and Makuleke villages, where they currently do most of their fishing. The latter dam was located about fifty (50) kilometres away. According to respondents, the reason why most fishers moved to other places is that fish was becoming scarce and the chief of Ha-Pitiboyi was giving them problems because too many fishers were fishing without licenses and he wanted them to obtain licenses. Before that, people used to catch up to an 80kg bag of fish per day. Respondents also reported that, for now, fishers needed to pay an entrance fee of R20.00 at the Pitiboyi Picnic spot, and the chief employed security guards and cleaners at the picnic site. A problem, however, seemed to relate to perceptions that the money collected went into the chief's own pocket and not to the community. Despite that the chief employed and probably paid security guards and cleaners, community members were reportedly unhappy about perceived individual gain from a government-owned dam.

Focus Group Discussion with Locally-Renowned Male Fishers

In the afternoon of 26 March 2011, researchers held a focus group discussion with the two locally-renowned fishermen, whom the chief had organized, at the home of one of the fishers (Figure 15). Both respondents were very keen to disclose details of how much fishing meant to them and the reasons behind their fishing activities. They both do not sell fish but eat them with their respective families. Hence, fishing to them is part of their "food harvesting" (i.e. subsistence) activities and a source of recreation for them.

The fisherman, 62 years, was the sole bread winner and still worked at Madzivhandila Agricultural College as a milker. He had eight dependents living with him at Ha-Budeli, where he was born and grew up. Mr Muvhulawa openly told researchers that he had been fishing on the very same morning but unfortunately the researchers had not found him at the fishing spot. He confirmed that he had some fish in the fridge, including the day's catch. He called on a child to bring all his fishing gear and a plastic bag with fresh Black bass (local name *Rasifeila*) fish, a newly introduced species in Nandoni.

Figure 15 Nandoni: Two locally-renowned subsistence fishers

Figure 16 Nandoni: Newly-introduced species of "Black bass" (*Rasifeila* fish: Venda)

The fisher that the *Rasifeila* fish (black bass) (Figure 16) is believed to control the population of other fish species to prevent overpopulation. This view confirmed earlier sentiments of a recreational fisher from outside the community whom researchers interviewed earlier on the same morning. The subsistence fisher fished mostly on weekends and sometimes during weekdays if arrived early from work. The dam was about a kilometre away from his house. He used fishing rods to catch fish and possessed four of these. He showed researchers one of his best fishing rods, which he bought for R800. He also showed researchers another rod that he bought for R550 from his savings. He did not remember the prices of his two other fishing rods.

The second subsistence fisher was 68 years old and a pensioner from a family of six and is a community member and fisherman. Only one son from his family is working in Gauteng Province. He said that, as fishers, they use rubber baits (i.e. artificial lure) and earthworms to lure the fish. He confirmed that Black bass fish prey on other small fish species. He stated that most of the local elderly men took fishing as a recreational sport, which they preferred over going to drink home brewed beer.

Interview with a Fisher from Outside the Local Communal Area

On the morning of 26 March 2011, researchers interviewed a white male recreational fisher from Louis Trichardt (Figure 17). The fisher, aged 38 years old and married (wife aged 33) with four children, was interviewed at the dam shore with his family. They had travelled about eighty (80) kilometres from home and spend the night camped on the dam-shore. The fisher's family felt free and safe enough to sleep over by the dam-shore fishing. The family had also brought a generator to supply them with power for lights throughout the nights when camping for entire weekends fishing (i.e. from Friday night to Sunday morning). Both parents and children are fishers. The family are self-employed, doing handy work and fishing during weekends when they are not working. The fisher told researchers that it was his second weekend/time fishing at Nandoni Dam. He and his family usually fish in other dams such as Greater Letaba. He catches fish for additional protein and sometimes keeps the catch in his friend's small dam at home for recreation. The family were among a number of white recreational anglers and fishers sometimes observed around Nandoni Dam.

The recreational fisher showed researchers four different species of fish species that he had caught. These included bream, 'black bass', redbreast tilapia and a sharptoothed catfish (Figure 18). He told the research team that his largest catfish weighed 7,5kg. He used chicken hearts as baits for catfish and earthworms for other species. He said that he had a 'breeding catch' at home for earthworm. He told the team that all months with letter "R" in them were 'good' fishing months. He also said that he had never been in trouble with government officials demanding a fishing permit. He had a boat that he uses when his fishing rods get stuck inside the water. His boat was less than 15 horsepower and used a car battery, but he could also use paddles or oars. At the time of the interview, fisher had eleven (11) fishing rods in the water while his children had theirs and were fishing next to him.

Figure 17 Nandoni: Subsistence/Recreational fisher and family

6.6 Discussion and Conclusion

According to Van Der Waal (2000) a large portion of the rural population of South Africa is in some way directly dependent on natural resources for subsistence and many rural areas experience water-related problems and a lack of expertise to manage resources. It is advisable to make available to the public information about better ways of their resource management that lead to sustainable development. It is also important to make the public or villagers feel that they own local natural resources and therefore need to manage these resources wisely for their own good. This would counteract prevalent perceptions that resources, such as dams, belong to "government" and people would feel more responsible to use their resource in a better way. Nandoni Dam provides essential resources of water for various purposes as well as food. The dam is surrounded by communal land under the control of several chiefs. Local people and outsiders from other areas use Nandoni Dam for subsistence, commercial and recreational fishing. They also use the dam as a source of water for domestic requirements, such as laundry and bathing, and informal small-scale economic enterprises, such as raw water vending and brick making.

De Jure open access to Nandoni Dam fisheries currently prevails. However, there is also a sense of a "common pool resource" among local people and (at least) one of the chiefs, who try to enforce their collective "right" of access by exercising control over access by outsiders. This informal governance arrangement has emerged in a context where there are no formal management organisations. Since traditional structures are respected, this informal arrangement is largely accepted by local people, who feel that unregulated and unreported commercial gill is not fair as too many fish taken. The issue of individual gain from public infrastructure is particularly worrying for members of local communities, who feel that it needs to be brought to the government's attention. Local views were generally that DWA should be responsible for demanding licenses fromfishers rather than self-serving individuals within local communities. However, capacity constraints within DWA might mean that a degree of devolution of responsibility might be required, coupled with effective accountability and transparency measures.

Some members of local communities also stated that overfishing by displaced community members, who lost their fields when the dam was constructed and were given inadequate or no compensation, should also be addressed. Views were that anger is destructive, and such people should therefore be convinced not to fish out of anger that they have not been compensated for losses of arable land. A voiced concern was that without fair compensation and engagement of these aggrieved stakeholders, anger over outstanding social issues might result in the persistence of overfishing and extinction of some fish species in the dam.

Figure 18 Nandoni: Recreational fisher with some of his catch

6.7 References and Bibliography

Department of Water Affairs, Water Services National Information System- (WS NIS) a Limpopo community report available at

http://www.dwa.gov.za/dir_ws/wsnis/default.asp?nStn=pg_reports&FilterSelection=true&AlphaChar=&Prov=9&DMCode=DC34&LMCode=NP343&curReportID=205&cid=3&cursecAuthorityCode=&curLinkID=&curYear=10&SearchStr=&curLevelID=3 Accessed on 25 April 2011.

Department of Water Affairs (DWA). 1998. List of Dams. DWA Dam Safety Section. Internet [***www.dwa.gov.za***].

Fouché, P., Vlok, W., Roos, J., Jooste A. & Luus Powell, W. 2010. Interim Report on Establishing the Fishery Potential of the Nandoni Dam in the Luvuvhu River, Limpopo Province. November 2010.

Van der Waal, B.C.W. 2000. Fish as a resource in a rural river catchment in the Northern Province, South Africa. Department of Biological Sciences, University of Venda for Science and Technology

7 MAKULEKE DAM, LIMPOPO PROVINCE

7.1 Introduction

Research on Makuleke Dam and surrounding villages was conducted in April 2011 by Gezane Attorney Hlongwane. In preparation for community entry, the researcher met with the head of Makuleke Royal Council to introduce himself and gain permission to interview local people, particularly fishers and different community-based stakeholders. The researcher explained what the research was about and what sort of questions he would be asking different stakeholders and a few households within the community.

Figure 19 Subsistence fishers on Makuleke Dam

7.2 Methodology

Following successful negotiation of community entry, the researcher began with a preliminary survey of indigenous knowledge and practices in rural communities around Makuleke Dam fishery, and then proceeded to collect data on current subsistence, recreational and commercial fishing practices and techniques. His data collection methods included field surveys along the dam shoreline, direct observation of fishing techniques and practices, interviews and focus groups with representatives of locally based organisations and fishers. As far as possible, the researcher endeavoured to capture the nuances of views expressed by respondents.

7.3 Background to the Study Area

The Makuleke are a Tsonga-speaking group of people. Prior to the nationwide tide of forced removals that followed promulgation of the Bantu Promotion of Self-Government Act of 1957, the Makuleke occupied the Pafuri Area to the north of Kruger National Park, at the intersection of borders with Mozambique and Zimbabwe (Tapela, 1997; 1999; 2001). This area, which is a triangular plain located close to the confluence of and between Limpopo and Luvhuvu Rivers, is prone to seasonal flooding. Flood recession leaves behind pools of water that provide habitats for a diversity of species of fish and other fauna and flora. The oral history of the Makuleke shows that members of this group of people have an enduring connection with inland fishing as a livelihood (see Volume 1, Chapter 4 on Indigenous Knowledge in Inland Fisheries).

7.3.1 Location

Makuleke Dam is located within land belonging to the Makuleke Community, who are located along the western boundary of the Kruger National Park and approximately eighteen kilometres from Punda Maria Gate to the park. According to Tapela (2009), the dam supplies most of the water requirements of a government-supported irrigation scheme located within Makuleke. Major sources of water for the dam are stream flow from the relatively minor Mphongolo River and surface run-off within the dam catchment. These sources are normally sufficient for the needs of both emerging commercial farmers and subsistence food producers in years of normal to high rainfall (375 – 590mm). The frequency of droughts and the seasonality and relatively low amounts of rainfall in the northern low-veld agro-ecological region, however, mean that assurance of water supply can be precarious.

7.3.2 Socioeconomic Profile

The Makuleke Community has a relatively low level of social service and infrastructure development. Social services infrastructure within the community includes three primary schools and one secondary school, a primary health clinic, an administrative office, an irrigation scheme office and community production centre, a bed and breakfast lodge and arts theatre owned by the Makuleke Communal Property Association (CPA),

a telecommunications office, individual mobile phone service providers, general dealer's shops, market stalls, and old and new brickyards. Since 2005, access roads have improved from the dust and gravel roads, which tended to become impassable during the rainy season, to a new wide tarred road linking the community to market and administrative centres, such as Malamulele, Thohoyandou, Polokwane and Johannesburg. Homesteads consist of a mixture of traditional mud and thatch structures as well as brick and iron or tile dwelling units. The number of households living in mud and thatch structures appears to have decreased from the 77.2% observed by Tapela (1997). The general socio-economic profile of Makuleke households reveals that mean household incomes are relatively low (Tapela, 1997; Tapela & Omara-Ojungu, 1999; Tapela, 1999; 2002; 2008) while the unemployment rate for heads of households and the rest of the working age population is relatively high (Ibid.). Local formal employment opportunities are scarce, and most males of working age tend to migrate to other areas in search of employment opportunities (Tapela, 1999). There is evidence of socio-economic differentiation among households. For many households, mean monthly income levels are relatively low, often below R1500 (Tapela, 2002; 2008).

7.4 History and Management of the Inland Fishery

According to key respondents, there had been no deliberate effort to establish a fishery at Makuleke Dam. No conscious effort had been made to bring in fingerlings from hatcheries elsewhere and no arrangements had been made to manage stocking and harvesting levels. Rather, fish populations had established themselves during successive rainy seasons. Common belief was that the fish species found in the dam had either been carried by floodwaters or swam upstream and downstream from rivers in and around Kruger National Park into the dam. This mode of fish introductions was also believed to be a continuing natural process. While Makuleke fishers had not observed any definite depletion of fish stocks since the dam was constructed in the late 1980s, concerns had been raised about possible over-fishing when increasing numbers of outsider fishers, some of who had motorized boats, began coming to fish in Makuleke Dam. The local Tribal Authority and elected CPA Executive Committee had responded to voiced concerns and intervened through instituting measures to control access to the dam.

For example, whereas formerly, government gave permits for fishing rods, now fishers go through the local leadership to ask for permission, more especially the outsiders. The latter are normally charged R1500 because of the high prices they charge for their "harvest". Makuleke Tribal Security is tasked to arrest and lay charges against outsider fishers who catch fish without permission from relevant local institutional structures. If the outsiders show some co-operation, they are brought before the local leaders and charged. If they refuse to come before the local authority, they are taken straight to the nearest police station. Although the local Tribal Authority and elected CPA Executive Committee had instituted measures to control access to the dam, there appeared to be a need for more coherent fishery management and governance arrangements.

The following section provides a more detailed characterisation of Makuleke Dam fisheries, including: the fish species composition; perspectives on the history and management of the dam; and inland fishery and indigenous knowledge and current fishing practices and techniques. The data was gathered through individual and group interviews with representatives of locally-based key stakeholder organisations, fishers and other local respondents.

7.5 Characterization of Indigenous Knowledge and Current Fishing Practices and Techniques

Research findings show that the fish species caught in Makuleke Dam include bream or tilapia (*getle*: Tsonga / *kweya*: Venda), goldfish (*ndhungulu*: Tsonga / *thabyi*: Venda), catfish (*hlapfi-ncila*: Tsonga / *bavhuri or mbole*: Venda), eels (*hlunga*: Tsonga / *kunga*: Venda) and "sardines" (*xindhungulwana*: Tsonga). Although the so-called "sardines" are a small type of freshwater fish that seems akin to *matemba* or *kapenta* (Malawi, Zambia and Zimbabwe), the exact taxonomic identity needs to be ascertained. Venda and Tsonga terminology is used to identify different fish species, which indicates that although many of the local people around the dam speak Tsonga, their spoken language does not indicate the these local communities' freedom from outside influences.

The use of both Tsonga and Venda terminology is due to several historical and contemporary factors. These include that, prior to the national wave of 'forced removals' which followed promulgation of the Bantu Promotion of Self-government Act of 1959, some of the Tsonga speaking people who were resettled in the Makuleke area had hitherto lived and inter-mingled with Venda speaking people in South Africa and Zimbabwe, irrespective of language, culture or creed. Those Makuleke people who were forcibly removed directly from the more remote parts of Pafuri Area in the northern region of Kruger National Park (presumably) had relatively less contact with Venda speaking communities. The elderly among such people have retained and disseminated not only the indigenous Tsonga terms for fish species, but also indigenous terms for associated fishing practices and techniques. The historical influences are contemporary factors, such as on-going migrations between Venda and Tsonga communities as well as a more recent influx of Venda speaking fishers from communities around Nandoni and other dams.

7.5.1 Findings from Locally-Based Key Stakeholder Organisations

A focus group discussion was held with representatives of key stakeholder organisations based in Makuleke Community. These included Chief Makuleke's eldest son, a senior member of Makuleke Royal Family, the Secretary of Makuleke Irrigation Scheme Executive Management Committee and an extension officer of the Limpopo Provincial Department of Agriculture. Further to this, an interview was held with a member of Makuleke CPA Executive Committee, but this respondent participated in the interview in his individual capacity and not as a representative of the CPA. Nonetheless, his insights were found useful.

The Makuleke Royal Family

The Makuleke Royal Family was representative was a senior member of the royal family and the head of the royal council. He was 53 years old and lives in an extended family household of six (6). He was unemployed and survived largely on money from his mother's pension (social grant). Only one of his family members works.

The royal family representative explained that Makuleke Dam belonged to the community because it was built in response to a request by the community. Makuleke's request for the dam was based upon their realization of the aridity of their present location in Ntlavheni area, where they were resettled following their displacement in 1969, relative to the wetter Pafuri Area, where they subsisted on natural resources around the floodplain and wetlands at the confluence of Limpopo and Luvhuvu Rivers. The community therefore saw it important for them to have 'a glimpse' of what they had in their former area. When the community came to the Ntlavheni area, they looked for an area where they could dig for themselves a well for water supply. They followed the "upward flow-way" (i.e. walked upstream) of Mphongolo River till they found a place where, according to their experience, they dug a well. The well was dug around a natural spring (called *xihlobo* in Tsonga), which is presently located immediately below the dam wall. He said there was another fountain at the upper portion of the dam called *bvuma nyundu*, which never dried up. Magakula said that a local traditional belief was that a snake, given a name 'tube' to describe the size of a snake, guarded *bvuma nyundu* spring. During rainy seasons water used to accumulate in the area around the springs. During the Apartheid era, government agencies used to bring water to the community using a tanker. The dam was built on the very spot where the fountain was located in early seventies. What is there now is just and extension the fountain. That's why the community have the power to control and look after the dam. The flow way where they dug was Mphongolo River which later they closed to make Makuleke dam. In early eighties the bigger plan came to extend the dam with the aim of starting up the irrigation Scheme.

Makuleke Irrigation Farmers Association: Mr M. P. Makamu

The secretary of the Makuleke Irrigation Farmers Association, aged 52, came from a household of three, in which he was the only person who is employed. He is a farmer, owns a small information and communication company and is also supervisor for '*Kha Ri Gude'* (i.e. a local adult education college) and founder of ABET initiative in Makuleke community. He has previously served in the Makuleke Community Development Forum (CDF) and for nearly a decade has been part of Makuleke Irrigation Scheme management. The secretary of Makuleke Irrigation Scheme management committee stated the dam was built in Gazankulu Homeland under auspices of the South African Departments of Water Affairs and Foreign Affairs within the erstwhile government. According to him, the dam "came" as a result of a collective request by the local

community, Chief Makuleke and the late Mr John Mashaba. Mr Mashaba was a farmer and businessman who ploughed land along the river long before irrigation scheme development. He was also a close friend of the former Chief Minister of Gazankulu homeland government, Mr Hudson W.E. Ntsan'wisi. Hence, the dam proposal was quickly recommended for approval and funding. Unfortunately both the chief minister and Mr Mashaba, who were influential in the planning process, passed away before irrigation scheme development and operation.

Regarding the governance and management of access to the fishery, the respondent stated that, formerly, the Gazankulu Homeland government gave permits for use of fishing rods, but now fishers go through the local leadership to ask for permission, more especially the outsiders. Currently, DWA, Makuleke Tribal Authority, CPA Executive Committee and local people collectively assist in controlling access to and use of the dam. The community controls indirectly by reporting to the Tribal Authority and CPA Executive Committee every outsider who comes to fish without permission from the local elected and/or traditional leadership. Outsiders are normally charged R1500 because of the high prices they charge for their "harvest". Makuleke Tribal Security is tasked to arrest and lay charges against outsider fishers who catch fish without permission from relevant local institutional structures[28]. If the outsiders show some cooperation, they are brought before the local leaders and charged. If they refuse to come before the local authority, they are taken straight to the nearest police station. The outsiders normally co-operate. They understand that they are in "other people's land" and therefore need to respect local protocols. The secretary further elaborated that seven fishers were recently brought before the Tribal Council by one of the village policemen (i.e. security officers) after they were arrested and detained at a police station. They were charged and fined but up to date the Tribal Authority was still waiting for payments of fines. One of the apprehended fishers had complained that an amount of R1700 was stolen from his clothes at the police station and he had no money to pay the fine. The secretary commented that the management framework for the dam, according to rules set out by the royal family, has been good so far.

Rangers from the LEDET Environmental Compliance and Monitoring Section come on request by the Tribal Authority; they do not just come and arrest fishers. The dam is not only used for fishing purposes only but for irrigating crops in the local smallholder irrigation scheme and also for domestic purposes. Apart from Makuleke and Makahlule villages of Makuleke Community, the respondent mentioned five (5) other communities and villages who regularly use water in the dam. These were Nkavele, Maviligwe (i.e. the third village in Makuleke Community), Block D (i.e. Hlungwane), Maphophe and Saselamani.

The Irrigation Board secretary was of the opinion there are plenty of fish in the dam, such that no species is under threat of becoming extinct. Currently, Makuleke Dam is not only used by the Makuleke people, but members of various neighbourhoods and distant communities also fish in the dam. The respondent stated that fishers sell their daily catch to households in Makuleke and neighbouring communities. Fish are sold so that fishers' families can put food on the table, meaning they sell some and leave some to eat. Fishing gear and tackle in current use is totally different from that historically used by the Makuleke in their former area (Pafuri floodplain). They now use fishing rods and cast nets, the latter of which are non-selective.

Regarding indigenous inland fisheries resource management practices, the secretary stated that such practices are no longer performed because Makuleke Dam is an artificial dam in the "land of the unknown"[29] (i.e. land that the Makuleke have only recently been domiciled since their resettlement in 1969, which is geographically different from their original territory in Pafuri). He said from the displaced area, they had laws that governed particular wetlands before fishing. The area currently occupied by Makuleke community is the land of "the unknown" therefore it is difficult for them to consult their ancestors or do what they used to do in their own land.

[28] In Makuleke, the most influential local leadership structure is a blended mix of both the Tribal Authority, which includes traditional institutions such as the chieftainship, tribal council and royal family, and the Communal Property Association (CPA) Executive Committee, which is elected. A third elected leadership structure, the Community Development Forum (CDF), exists and works closely with municipal structures but its legitimacy appears to be contested by traditional and CPA leadership. Such contestation is worth bearing in mind in consideration of possible local institutional arrangements for inland fisheries management and governance.

[29] See the Makuleke song 'Davhula manhanga' in Section 4.3.3.3 of Review Report (Deliverable 3 Report 2)

He further said that he remembered that in one of the wetlands in Old Makuleke (i.e. Pafuri area), when the beating of drums was heard it indicated that people could go fishing. There was no need for them to first consult ancestors[30]. He said the sound would start at a distance. If you did not move away from the water, the drum beating would continue to come closer and closer and then a "scary 'movement of water' would start and no one would wait to see the next events because it was very frightening". Not all people or families were allowed to perform such rituals but one particular family, which was associated with the wetlands, was responsible for performing the rituals before fishing took place.

Royal Family Member

According the Chief's eldest son, there was no need for subsistence fishers to obtain licenses to fish. Besides fish, there is a special vegetable called *dedeledede* in Tsonga/ Shangaan language, which grows close to the dam and not anywhere else in the vicinity. People must be allowed to harvest such resources as fish and aquatic vegetables for free. The respondent said this after he quoted the Bill of Rights that provides citizens with access rights to natural resources, as long the harvesting and use of such resources is lawful.

He further explained that the Makuleke community has a right to control the dam because:

- The dam belongs to the community, which is why it is named after it;
- The dam is located within Makuleke community land, and its construction resulted in losses of access to pre-existing croplands, wetlands and springs;
- The dam poses dangers to the community, and the use of its resources by community members is therefore compensation for the costs of living with dangers such as waterborne diseases, crocodile and hippo attacks, drowning and flooding;
- The Makuleke community and surrounding villages know the dam well, including all the good aspects and dangers of it. Meanwhile, "government" is out there, only knowing the dam on the map.

Agricultural Extension Officer for Makuleke Irrigation Scheme

The agricultural extension officer was born in 1955. He is from a family of seven people. He works for the department of agriculture as an extension technician at Makuleke Irrigation Scheme and he is the only bread-winner in his household. He started working in the Department of Agriculture in 1985 and transferred to Makuleke in 2007.

In his view, the dam is for all people. It belongs to the state and that is why the government is now enlarging the spill-way for community safety, not only for the irrigation scheme. The dam supplies water to a smaller balancing dam within Makuleke Irrigation Scheme. Water is abstracted from the dam throughout the week, particularly when farmers are sowing and when crops are young.

He further said that the dam is monitored by Limpopo Department of Agriculture (LDA) and the agricultural extension technician (i.e. himself) gives technical advice for people to avoid making the dam a dumping place. As an extension technician, he holds regular meetings with farmers, addressing pollution issues and advising on how farmers can pass messages to their communities.

The extension officer personally regarded fishing as legal at Makuleke dam. If not, the fishers should be arrested by the Tribal Authority, which has power and oversight over the dam. He said outsiders should be arrested if found fishing in the dam because, not knowing the dam well, they expose themselves to risks of attack by the many crocodiles in the dam and they pollute the dam. By contrast, local people are regularly alerted of such dangers and advised to guard against dam pollution in community meetings.

[30] Contrary to the old fishing rituals and practices that did not require Makuleke people to consult ancestors at the onset of each new fishing season (indicated by the sound of drums) in Pafuri, the Makuleke consider that since they are now domiciled in a strange land, they would need to consult their ancestors before attempting to communally perform their indigenous fishing rituals and other practices. This attests to the sense of alienation that still prevails within this rural community.

Regarding access and use of the dam for fishing, the extension officer stated that community leaders deal with fisheries issues. However, since there was no active law enforcement, people continued to plough along the dam shore and to fish without licenses. The respondent's view was that if access to the fishery is well-managed and the revenue from locally-issued fishing permits is used to contribute to community upliftment, then use of the dam for fishery development will be acceptable. However, there was a need for fishery management to deal with the issue of pollution, which remains an outstanding environmental issue for Makuleke Dam.

Makuleke Communal Property Association (CPA)
A representative of the CPA was a man aged between 50 and 60 years, who lived in a household of five people. He worked for a local high school as the vice principal while his wife works for a local ABET school. He had served in the Makuleke CPA for a very long time and remains a member of the recently elected Executive Committee.

He said members of the community adhere to rules that govern the dam, such as:

- People not bathing in the dam; and
- People not dumping their clothes and other litter in the dam.

Fishers, however, ignore the laws regarding getting fishing permits[31] and no one is controlling the issue of fishing. In the past when permits were actively applied and monitored, they allowed fishers to catch certain sizes and types of fish. Now that there are no control measures, fishers take everything caught by their rods and nets. Breeding is very slow for some fish species and these will likely become extinct in the dam because there is no proper control. He recalled the *xihoko* fish (a species of cat fish said by local respondents to be indigenous to Limpopo River system) and the tiger species, which are very rare to see. He said that these kinds of fish will go extinct because the fishers take all species regardless of situations pertaining to different species.

The respondent stated that non–selective nets are not allowed because sometimes they trap crocodiles, which is also very dangerous to fishers' lives. No one is addressing the problem of non-selective nets because of the lack of information.

In his view, fishing is not a bad thing to do, but the way it is currently done in Makuleke Dam is very bad. He said fish is very important in human health and should therefore be used wisely and conserved.

7.5.2 Findings from Rapid Appraisals of Fishers and Local Key Respondents
This section presents findings from interviews with various fishers who were found at Makuleke dam over the course of five (5) days, of which some days were during the week and others on a weekend.

Subsistence Fisher A of Makuleke Village
An unemployed male subsistence fisher from Makuleke Village, aged 35, was interviewed. He lived in a household of six (6) where only one man is employed and the only other sources of income are his elderly parents' social grants (pensions).

He related that he was from a fishing family, the family grew up eating fish, and he began fishing in 1982, when he was six years old. He learnt fishing from his mother, who was a great fisher. However, she does not fish anymore because she has become wheel chair bound. Nearly everybody in his family knew how to fish. His mother used to use fishing rods that had reels tied on them. So he also started by using the same material. He is now using casting nets, including both a non-selective net and a "normal" selective fishing net. The non-selective net catches everything on the spot, including both big and small fish.

[31] The respondent here is referring to the Limpopo Environmental Management Act (Act 7 of 2003). In an interview on 09 September 2011 LEDET Permits Officer, Mr Sam Makhubele, stated that requirements for fishing permits for inland fisheries outside of nature reserves and similar protected areas are currently under waiver (see also Section 4.2 on Flag Boshielo Dam).

He normally went to fish at night and sometimes very early in the morning. His reasoning is that fish cannot see him when he stalks to cast a net on the spot where he knows he has previously put some 'feed'. He fed the fish so that they become used to the spot where he feeds them. He fed them with left-over food from home, which he mixed with fermented sorghum dregs that are removed after preparation of traditional beer. The fish were quick to detect where the food is because of the smell. He marked every spot either by using a stick or anything that could float in water for him to see. He had ten spots or areas where he usually fed and caught fish, and left the rest of the available fishing spots for others to fish. He claimed the ten feeding spots as his 'territory' and excluded others from access to these. Hence, no one came to fish in those areas except himself. Other fishers also had their own areas along the dam. All regular fishers know who fishes where, unless the fisher was new to the dam.

Figure 20 Makuleke: Subsistence fisher demonstrating his fish feeding and seine net fishing technique

The researcher made arrangements to go with the fisher during the night-time to his fishing territory to witness his fishing techniques, from preparing his fish feed and fishing spots to catching the fish. While he was busy preparing to go to the dam, a man stopped by asking for some fish but all his stock was already sold. The researcher subsequently went out to the dam with the fisher early in the morning because he changed his fishing schedule for the day because of the wind. He said that the wind affected his catch badly because it blew long time during the night and as a result he only managed to get half of a bucket.

The subsistence fisher was observed preparing his home-made fish feed and throwing it into a spot in the water (Figure 20). This was his means to lure fish to congregate in a particular spot. After two to three hours he came back and slowly stalked toward the spot and cast a seine net to cover the entire area. He made sure to pull back the rope once he was sure "everything was settled well". He explained that local fishers call the casting net a "parachute" because when it lands on water, it lands like the real parachute used in aeroplanes. When the net closes, everything found eating on the spot is caught, including fish and other aquatic macro-organisms. He said he did not release the small ones but took them home to eat.

He said considered his catch good when he filled a 25 litre bucket and a half. With such a catch, he earned up to R550 from selling fish locally. He used the income from fish sales to buy additional food for his household and saves some of the money in case the seine net gets damaged and needs replacement. Although no proper marketing facilities existed within Makuleke, members of the local community and people from nearby villages knew that he sells fish and they walk, cycle or drive to his house to buy fish. He considered his catch bad when he gets half a bucket because then he makes little money since he has to set aside a portion of the catch for his household consumption. He ate the fish braaied (i.e. roasted) or cooked. He demonstrated to the researcher how he roasted and ate the fish.

Regarding concerns about personal safety, the subsistence fisher said that safety cannot be guaranteed because there are many crocodiles in the dam. He gave an example of one of his brothers, who was saved from the jaws of crocodile some years back by people who were close the scene. These people shouted and threw stones into the water till the crocodile released his brother. He said rangers have not bothered them since 1996. They used to demand fishing permits and if a fisher did not have they would be arrested

and either be fined or imprisoned for three (3) to four (4) months. He further said that local authorities do not bother them because the Tribal Authority and other community leadership structures know that some families survive on harvesting resources from the dam.

The Makuleke subsistence fishers concerns were:

- He was concerned about outsiders because some of them placed nets in the water and when they fail to come and check them, because of problems with transport, fish that are caught rot inside the water and it scares other fish away. Consequently, local fishers who use seine nets end up catching nothing.
- He hated sharing the dam with outsiders because they take local fishers' customers away. Many of the outsiders come from "Venda" (i.e. former Venda Homeland areas), mostly from areas where communities do not have dams.
- Some of the outsiders use motorized boats and when they go out into the dam the boats make lots of waves and scare the fish away, including the very fish that seine net users should have caught[32].
- He told the researcher that outsiders using a fishing boat once found a crocodile caught in their net, killed it and pulled it to an island in the middle of the dam, which was very bad practice. Contrary to local protocol, the outsiders never reported this incident to the local authority or the government department concerned.
- He is scared of hippos, which normally come out at night, but is not afraid of crocodiles because they are afraid of men.

Subsistence Fisher B of the Makuleke Community

Subsistence Fisher B was aged between 26 and 35 years and the head of a household of three people, in which none of the adult members are formally employed. He was the sole breadwinner and the entire monthly income for the household came from his informal fishing activities and a childcare grant of R260 for the only child in the household.

He started fishing more than ten (10) years ago, when his friend taught him how to catch fish using a net. He said that he used a non-selective net and sometimes caught small fish (i.e. fry), which he releases back into the water. He fished three (3) times a week. He normally put home-made fish feed in his fishing spot, waited 30 minutes before he started fishing, and then spent two hours fishing after feeding. His highest catch was a 25 litre bucket and a half, while his lowest catch was half a 25 litre bucket. The respondent explained that the length of time he spent fishing depended upon prevailing weather conditions. On cloudy days, he started fishing in the morning when the light is dim, which makes it difficult for fish to see him clearly when he stalked to throw a net. On clear days, he fished during the night. To him, summer seasons were the best time for fishing. He said that during winter, fish prefer deeper water and are therefore more difficult to catch. In summer, by contrast, the fish move from deeper cold water to shallow water which is warmer. This makes it easier for fishers to catch the fish from the shoreline.

He sold his catch locally and outside of Makuleke community. He kept a few fish for his household to eat. He sold an open plastic plate filled with fish for R20.00. The highest amount he has earned in a single day was R350 and the lowest was R100. His maximum catch size is one 20 litre bucket and a half, and the lowest catch size is half a 20 litre bucket. He told the researcher that fish is in high demand and selling fish raises money very quickly (i.e. selling fish provides a source of quick income). He managed to buy his first bed from the money raised from selling fish. He was now staying in his own residential plot, which he bought with money saved from fish sales.

The respondent revealed that, like many fishers on Makuleke Dam, he did not have a fishing permit and when rangers come to patrol they run away. His view was that no law applies and everyone goes to fish at his own risk. He said that the Tribal Authority also monitors the dam but does not bother fishers. Both

[32] Her frustration should be seen in context of the fact that the technique used by local seine net fishers involves a carefully orchestrated process of feeding, waiting patiently for fish to settle in the feeding spot and finally casting the net. Disturbance of water by boats disrupted this process, resulting in curtailment of seine net fishers ability to catch fish.

men and women fish in the dam. Normally, a fisher can be anyone above the age of fourteen (14) years. However, the youngest of fishers are mainly boys. Nets and fishing rods are the main fishing materials currently used. He told the researcher that he did not feel safe when fishing in the water because there are crocodiles, hippos and snakes in the dam.

Elderly Fisher Couple

An elderly couple aged between 60 and 70 years were interviewed. Their household consisted of five (5) people. Only one of their sons was employed as a gardener. The husband was former government employee and both him and wife his received pension grant money.

The husband could not remember when he started fishing because it was a long time ago, when he was a young boy. He started fishing in a river in the Pafuri area prior to his family's forced removal. After resettlement in present-day Makuleke, he continued to fish in Mphongolo River (i.e. the river along which Makuleke Dam was constructed). He has always used fishing rods and is still using fishing rods, with earthworms and stiff 'pap' (i.e. maize porridge) as baits. He caught fish for subsistence. He liked eating catfish because it has fewer bones. He went fishing three (3) times a week. His highest catch was around thirty fish, and the lowest catch five to ten fish. He often caught "pencil size" fish (i.e. roughly 20 to 25cm long). Hi wife added that she had made the dam her "best friend". She said when both of them fished at the dam she used to wish that the day could stay like that always. She enjoyed every moment of it. Mr Makhubele explained that his wife was also a fisher but no longer fishes. The couple has never sold a single fish. Rather, they share their fish freely with those who are in need.

Regarding issues of access to the fishery, Mr Makhubele told the researcher that rangers used to bother them in 1985 but since the new government (i.e. post-Apartheid) took over things began to change. He stressed the point that the local leadership and government take care of the dam. By enlarging the spillway, government showed that it cares a lot for Makuleke Dam. He further said that most people who fish at the dam are male. There are fewer females, although there is no law that prevents them from fishing. Under-age children are not allowed to fish because they are not as careful as the adults. To Mr Makhubele, sharing the dam with outsiders was not a problem at all.

Regarding personal risk and safety issues, Mr Makhubele said he feels very safe from attacks by crocodiles and hippos since water in the dam is very clear. He also said around nine (9) people have lost their lives in the dam since its construction. Deaths are largely due to crocodile attacks and drowning. Last year in 2010, a man from Boxahuku (i.e. Maviligwe village, which is one of the three Makuleke settlements) disappeared in the dam and was never found. Those searching for him only found his clothes and bicycle. Another person from Block D (i.e. Hlungwane) was drowned after trying to bring out a hippo that had been shot. The white man who shot the hippo had told the people present not to get into the water if they did not know how to swim, but the man ignored him and claimed that he could swim. The drowned man left behind his two wives and children.

Some of the rules pertaining to the fishery included that:

- Local fishers should not allow anyone, particularly outsiders, to throw dead fish back into the water since these would rot and affect water quality; and
- Members of the community should not allow anyone to wash or bath in the dam, in order to avoid contamination and the risk of disease, since the water is used for food production, drinking, cooking and fishing.

The respondent stressed the point that the dam helps many communities with access to water for their cattle. It also supplies water for the irrigation scheme and, thereby, provides livelihoods, employment and food security for many local people working in the irrigation scheme. Confirming an earlier view by the chief's son, Makhubele further said there are also some special vegetables, including *dedeledede*, that grow nowhere in dry land except around the dam and surrounding wetland areas. Usually, members of Makuleke Community harvest and cook these vegetables with fish.

Subsistence Fisher C of the Makuleke Community
Subsistence Fisher C, who stayed in Makuleke village, was aged between 30 to 35 years and unemployed. His means of survival were part-time jobs and fishing. He came from a household of five (5), which consisted of four (4) adults and 1 (one) child, who received a social grant of R260.

He was taught to fish using fishing rods by one of his cousins in the year 2000. They both used termites and earthworms as baits. He now used a casting net. He decided to begin fishing because there were no jobs. Fishing helped him raise money to buy additional food in the household. He normally come to the dam for five (5) days in a week. He sold the fish to the local villagers and sometimes in the small town of Malamulele, which is about 15km away. He told the researcher that his maximum catch size was two full 25 litre buckets in a day. His maximum income from selling fish on any given day was R500, and the lowest earnings were R150. The respondent displayed to the researcher examples of sizes of fish most fishers desired catch when they arrived at the dam.

Subsistence Fisher D of the Makuleke Community
Subsistence Fisher D was a male fisher aged between 25 and 30 years. He came from a Makuleke household of five (5), in which none of the three (3) adults is employed. The family survived on an average monthly income of R730 from casual jobs and R520 from social grants for two (2) children. He started fishing in 2006 when one of his cousins taught him how to fish. He began by using fishing rods and then learnt how to cast a net, which is the technique he currently uses. He sold his fish in local villages and fish was also a major dietary source of food in his household. Members of his household fry, roast or cook their fish, but do not dry it. The highest amount of money that he typically earned selling fish from a good catch was R180 per day. His 'good' catch was half a 25 litre bucket. He determines his prices using a dinner plate at R20 each for each plateful. He used public transport (i.e. buses and taxis) to travel to nearby villages to sell his fish. Rangers have never bothered him. He normally fished 4 to 7 days a week when he was free. He does not feel safe fishing because there are crocodiles and hippos in the dam. However, he was compelled by circumstances in his household.

Subsistence Fisher E of the Makuleke Community
Subsistence fisher E was a young Makuleke man aged between 25 to 30 years. In 2009, when he was unemployed and needed to eke a livelihood, his brother taught him how to fish using a fishing rod. He now used both the non-selective seine net and "normal" selective net. Most of the young men in his age group come from different neighbouring villages to Makuleke Dam to fish. They come from villages such as Maphophe, Block H (i.e. Makahlule village of Makuleke Community) and Block D (i.e. Hlungwane).

In the past when he used a fishing rod, he used to use termites and earthworms as lures for the fish. He used to catch very small amounts of fish. Now that he was using nets, his catch was a little better than before. His biggest catch is half a 25 litre bucket. He sold a few of the fish and keeps the rest is for his household. The highest amount he has ever earned in a single day from selling fish was R200 and the lowest was R80. From such income, he contributed to buying food within his household and gives some of the money to a school-going child to use at school. Hippos and crocodiles were his main concern when he goes fishing. Crocodiles have been known to kill people in and around the dam. Although hippos have only scared fishers, they can be dangerous

Subsistence Fisher F of the Makuleke Community
Subsistence fisher F was an unemployed young man of 20 to 25 years of age. He came from a household of five (5), of whom four (4) were adults (i.e. aged 18 years and above). Both his parents got pension grant money.

He started fishing at an early age in 1997. His mother taught him how to fish using a fishing rod but he now used a 'casting' net (i.e. seine net). A friend taught him to how to use the casting net. His favourite fish species are the breams, Mozambique tilapia and catfish, which he often catches. Fishers seldom catch eels. He released the small fish back into the water. Half a 25 litre bucket was his biggest catch and his highest income for fish sold per day was R350, and the lowest was R150.00. He also took some of his catch home to eat. He enjoys eating the fish braaied or cooked.

He went fishing daily at night and he felt uncertain of his safety because of the crocodiles and hippos in the dam. His personal circumstances (i.e. poverty and unemployment) forced him to do so and night-time was the only time when larger fish move from deeper water to shallow water in search of food. During the night, however, crocodiles also did not stay in deep water but, liked the large fish, they preferred to search for food in shallow waters.

Regarding issues of access to the fishery, the respondent does not mind sharing the dam with outsiders because fishing is also their means of survival. He told the researcher that any one is free to fish, regardless of male and female gender. He recalled that he was bothered by the rangers in 2005. They took away his bucket full of fish and emptied it at the back of their van and left. His net was not taken because he had hidden it under the water. So he was left with an empty bucket and a net. He has never paid any fee for fishing permits. He said there are no rules and the fishery is not well managed. He said that since 2005 rangers have not bothered fishers in Makuleke Dam.

He confirmed other respondents' statements that besides fishing, the dam is used for a range of other uses. Members of his household often get water to bath and wash their clothing from the dam. Sometimes fishers also drink raw water from the dam, using their shirts to sieve out the dirt.

Subsistence Fisher G of the Makuleke Community

Subsistence Fisher G was a male Makuleke fisher aged between 35 and 45 years. He is from a household of two (2) namely, his mother, who receives pension (social grant) money, and himself, who is unemployed. They both survived on social grant money and income that Simon raised from informal fishing activities.

He started fishing at the age of 14 years. His late father taught him to fish using a fishing rod but he now used a fishing net (i.e. seine net), which one of his friends taught him to use in 1997. He fed his fishing spots at around 3pm each afternoon and waited for an hour before he started fishing. When the number of fish caught dwindle, he takes a break then returns again in the evenings and fishes one more time. Early in the mornings, he goes back again to the same fishing spots and fishes once more. In all, he fishes three (3) times in each spot where he has put the feed. He fishes on five (5) days in a week. He takes all sizes of fish (i.e. does not release the small fish) because some of his customers prefer the small ones and they buy them very fast. He sells some of his catch and leaves some for his household. He prefers to eat the fish roasted and cooked. He and his fisher friends sometimes have 'braais' and eat fish at the dam, where there is a fire place.

His highest catch per day was three (3) 20 litre buckets, which earned around R900 to R1000. His highest income from fish sold per day is R650 and on bad day his daily income is around R220. He normally sells the fish in other villages and has many customers. They sometimes call him by phone to bring them some fish. He sells a 20 litre bucket of fish for R450. Transporting the fish is a challenge because taxis to Nghomunghomu village, where most of his customers live, are very scarce. Despite this challenge, he is now able to pay a monthly installment of R850 from money raised from selling fish.

In the dam, he is only scared of thorns but not crocodiles and hippos. He said that he sometimes catches smaller crocodiles in his net and releases them back into the water. It is hard to do that because while doing so, a crocodile struggling roughly can destroy the net.

He does not like sharing the dam with outsiders because the dam supports his family and enables him to eke a livelihood since he is not formally employed. He views open access by outsiders as a threat to the sustainability of his livelihood. He said that most outsiders have recently moved away from Makuleke Dam to 'Sterkrivier' (i.e. Middle Letaba Dam).

Local leadership does not give fishers any problem. No one demands fishing permits from them. Long ago, however, authorities required fishing permits from fishers.

Subsistence Fisher H of the Makuleke Community

Subsistence fisher F is an elderly woman aged between 55 and 65 years. She was born in Mozambique and grew up there. She is lives in Makuleke in a household of nine (9) people. Four (4) of the household members are employed either in formal paid jobs or informal self-employment, three (3) are at school and two (2) are unemployed school leavers aged above eighteen years[33]. She survives on money from her children and supplements this with fishing in Makuleke Dam.

She started fishing while she was a young girl. Her brother taught her to fish in the Limpopo River. She goes fishing everyday. She uses fishing rods and earthworms and termites. She normally fishes alone. She said other women used to come but they were using shade-cloth nets, whereby they use one net and work in pairs while standing in shallow water close to the shore (Figure 21). However, the women had stopped coming to fish because fishing boats were disturbing the fish from coming closer to the shoreline. She hopes that the fish will now come closer to the shore since the boats are gone.

Figure 21 Shade-cloth net fishing technique by a pair of Makuleke women

The respondent usually starts fishing early in morning and continues until around lunch time (i.e. 1200 to 1300 hours). Like a number of other regular fishers, she first feeds her fishing spot. However, she starts fishing immediately after that and does not wait as respondent male fishers do. Her highest catch is a full 10 litre bucket. She releases the small fish back to the water. She fishes for subsistence but she sometimes sells some of the fish. Her highest earnings from sold per day is R50 and the lowest is R10. She eats the fish cooked. She sometimes shares the fish with her cousin. She fishes every season and any time of the day is fine with her. In fact, she spent most of her time at the dam.

She said she feels very safe in the dam and keeps her eyes focused on the water. When she sees any movement in the water, she immediately leaves the water. She recalled hearing of an incident in which one of the villagers, who was hurt by a crocodile, later passed away from the wound. She told the researcher that hippos do not bother her. She then pointed out to the researcher three (3) hippos at a distance.

Regarding access to the fishery, she had never been bothered by rangers and had never seen them around the dam. Local leaders never bother her either. She said she did not know whether or not other local fishers around the dam had fishing licences. However, she did not have one herself.

Subsistence Fisher I of the Makuleke Community

Subsistence fisher I was a young Makuleke man aged 36 years (Figure 22). He came from a household of five (5), of whom three (3) are above 18 years old and two (2) are below the age of 18. Only one adult was formally employed. Another adult got pension grant money. He was unemployed.

He fished on five (5) to six (6) days in a week. He goes fishing from around 2000 hours at night to the early morning hours. He started fishing in 1993. Because of poverty, he taught himself how to fish using a fishing rod. He now uses a throw net for fishing (Figure 21). He said he first prepares the area his feeding spot by clearing dirt and floating matter from the place so that the net can land freely. If the feeding spot is

[33] The respondent considers herself to be self-employed.

littered, the net is disturbed and fish can slip out easily. He then feeds and later catches the fish. His highest catch is two (2) 20 litre buckets, and the lowest is half a 20 litre bucket. His highest earnings from fish sold per day is R300 and the lowest is R150. He takes all sizes of fish and does not release any. He sells some and leaves some for his household. He eats the fish cooked. He sells his fish locally and in nearby villages, and can make up to R700 a week.

Figure 22 Throw net used by Makuleke subsistence fisher

Regarding access to the fishery, he stated that the Tribal Authority never bothers him and rangers never come. He hates sharing the dam with the outsiders because they take away the local fishers' customers. This is due to that outsiders catch larger fish with their selective nets and use fishing boats. However, such outsiders are no longer fishing in the dam since they were told to "pack and leave". He is finally happy because customers are finally coming back to him.

The respondent reported that he did not feel safe and free at the dam because he comes during the night, which is the only time when big fish come out from deep water for feeding in shallow waters and also when crocodiles do the same. He said that he once caught a crocodile in his seine net and managed to pull it to the shallow waters. However, while he was still trying to get it out of the water, the rope broke. The crocodile spun around at the same place until the net broke. He said he was so scared that he immediately left the dam and returned to collect his broken net the following day. He commented that calves are often caught by crocodiles at that same spot.

The respondent concluded by saying that the dam serves different communities with water and fish. Fishers eat some of their catch and earn incomes from selling portions of their catch, while non-fishers buy the fish that fishers catch in the dam and sell. He said both males and females fish. The subsistence fisher finally said that if the dam dries up, there will be a big problem for many people and for livestock and wild animals.

Group of Three Fishers from Makuleke

During a field walk around the dam shore, the researcher met and interviewed three young men holding a seine net at a point along the shore. The fishers said that they regularly feed the fish at a marked fishing spot. Like other Makuleke fishers who use this technique, their home-made fish feed consists of left-over food mixed with fermented sorghum dregs removed after preparing traditional beer. When fermented sorghum is used, fish detect the smell and can quickly identify where the food. They normally feed and wait for two to three hours before they start fishing. These fishers prefer fishing during the night or early in the morning. On the day of the interview, they reported that their catch had been bad because the wind blew during the night they were forced to change their time schedule. Meanwhile, the fish had eaten the feed and gone away. The fishers also alluded to the hard work and very long hours spent fishing during the night.

The respondents did not have problems with over-fishing, since fishers are "controlling the fish population"[34]. The three fishers do not have problems sharing the dam with outsiders because they, too, are doing it to supplement their families' food requirements or for survival. The three fisher friends merely tell outsider fishers to be aware of hippos and crocodiles. The outsiders' responses are always positive.

[34] The respondents did not explicitly say how they controlled the fish population, but seemed to imply that they did so by avoiding excessive harvesting and assisting with the control of access by outsiders, particularly those using boats and large selective nets. In the absence of any clear guidelines regarding catch size, for example, it is not clear whether or not local fishers – who are invariably resource poor – would maintain their stance to avoid excessive fishing if they acquired the resources to conduct harvesting at a large scale.

Regarding personal risk and safety issues, the respondents said that they trust themselves and will face any danger that will come their way. They also told the researcher that outsiders have since gone away (i.e. outsiders no longer come to fish in Makuleke Dam). However, later in the same day the researcher met one of the outsiders in the village. The three fishers said outsiders were told to go by the community because of their susceptibility to safety risks in the water, which were associated with their use of motorized fishing boats. By contrast, members of Makuleke Community were aware that local fishers do not use fishing boats and are therefore not in any serious danger.

On the issue of environmental management of the dam, respondents said that local fishers sometimes bath close to the dam shore. They draw water from the dam using buckets and bath outside the dam.

Fisher from Outside the Makuleke Community

The subsistence fisher resided outside Makuleke community and lived in one of the rural communities close to Nandoni Dam. He used to fish at Nandoni Dam. He is a young man aged between 20 and 25 years who comes from a household of seven (7), which consists of four (4) adults of whom only two (2) are employed. His main reason for fishing is "survival", since he does not have a job. He was quick to point that there is a lot of money that one can make from fisheries resources in dams. However, he also stated up front that he did not feel free to disclose money issues (i.e. income earnings), which the researcher accepted.

He explained that a selective net catches fish of a certain size, and he uses a size three-and- a-half (3.5) net that only catches medium size fish. He described both his progression from an unemployed youth to a fully-fledged fishing-based livelihood and his shift from fishing in Nandoni to fishing in Makuleke.

He started fishing when he was a boy way back in 1998. He learnt fishing from following others. He started fishing in Luvhuvu River, before Nandoni Dam was constructed. He started by using fishing rods and casting nets in the river with friends.

After completion of Nandoni Dam construction, some people started using fishing boats. At first, he was too afraid to use a boat but was forced by poverty circumstances to enter into the water and use a boat. He observed that his friends would come to the shore with lots of fish while using fishing boats. He then decided to go with them by boat into the water in order to learn how such fishing was done. Following this, he learnt to use a fishing boat alone. After a long time, he became used to the practice and was no longer scared of venturing into the water on his own. He went through a series of two arrangements with boat owners before he ended up forming a team[35] with someone else, who had the requisite financial resources to invest in the 'joint venture'.

His partner, as an investor, bought all the gear and tackle, including a boat, nets and other material. The "man" always bought or replaced any damaged materials. His own tasks, as a fisher, were to enter into the water, set up the nets, haul in the catch and take it to shore. His partner/boss paid him R1000 every week. He said the partner had regular customers to whom he delivered fish everyday. Whenever the partner/boss went to deliver the fish, it was time for him to make money for himself. He sold whatever fish he caught to people who came to the dam while his boss was away. The boss later employed someone so that they would work being two on the boat. He said he always fought with the new employee because he spied on him. Sometimes the two fishers would fight while inside the water. He said the newly employed man would sometimes take all the paddles (oars) if they argued about direction to take while fishing. Conflict with the new employee was the reason why he quit from working for his former boss.

He further told the researcher that before the aforementioned venture, he once had an agreement with another man, who had a boat but required him to produce only a bucket of fish every week, not aware of "what was happening in the dam" (i.e. that boat fishers were landing much larger catches per day). He then

[35] The respondent did not make a clear distinction about whether his team-mate was a 'partner' or an employer (i.e.. 'boss). He variously referred to the man as either one or the other, depending on different circumstances. From Pfarelo's account, it appears that the joint venture began, at least in his view, as a partnership but ended up as an employer-labourer relationship.

used the man's boat with his friends to catch most of the fish for himself. The same friends later turned their backs against him and reported him to the man, who ended up confiscating the boat and lending it to his friends. As a result, he said he no longer practised fishing in Nandoni Dam because he does not own or have access to a fishing boat.

He also told the researcher that prior to the foregoing arrangement, he used to hire a fishing boat from someone, who has also moved to operate in another dam. In this arrangement, he needed to give the boat owner only two (2) fish per trip. There were six (6) other groups of fishers who hired the same boat from the man, which severely limited the extent to which he could earn a living from the arrangement.

Regarding his move to Makuleke Dam, he said at first, he and other outsiders fished at Makuleke dam without consulting the leadership and they were summoned before the chief and told to be careful because there were crocodiles and hippos in the dam. They were also told to be careful of the policemen because they could confiscate their fishing gear and tackle. For a while they encountered no problems but eventually the rangers and police came and confiscated one boat, clothes, nets and pans. These items were never returned to fishers, and fishers never reported the issue to the chief. The local leadership never told them to pay money for access to the fishery. Local people from Makuleke Community have never given them any problem regarding access to the dam for fishing. He sells most of his catch. He normally checks his nets three (3) times a day, in the morning, afternoon and evening. His catch is good when he has two (2) 25 litre buckets of fish and a bad day is when he gets half bucket.

Regarding fishing in Nandoni Dam, he said that police, rangers and Chief Khaneni do not allow fishing boats or nets in the water anymore. He said nets cause problems to boats that use engines. There are notice boards that clearly indicate that no net fishing, no boating and only fishing rods are allowed. Any boats and nets that are found are removed and burnt and the fish confiscated. Nandoni fish are "very clever" and they now "know the net", hence sometimes one can set up the nets and get no fish. "They" recently introduced fifteen (15) new species in Nandoni Dam but it is hard to catch them. The fish are 'marked' and if a fisher catches one of them, he is given money as a reward. When people heard of the price money, they began working very hard to catch such fish but up until now only one had succeeded. He surmised that, compared to Makuleke, fish business was much easier at Nandoni because there were always customers, who buy for fish for re-sale. He further said that at Makuleke, people only buy fish for consumption not to sell and they only buy for R20 or R30, depending on household size. By contrast, fish sellers in Nandoni buy buckets of fish and each bucket costs R250.

7.6 Discussion and Conclusion

The field research findings provide an original insight into local and traditional knowledge on the use patterns and local governance institutions at Makuleke dam, which show that Makuleke Dam provides an essential source of water for various purposes, including food in the form of fish. The dam is used by locals for subsistence and commercial fishing purposes. However, fishers and other dam users tend to abuse the dam without caring about how what they are doing affects the dam.

The main findings from the evidence above are that:

- Makuleke Dam is an active subsistence/artisanal fishery that supports local livelihoods;
- Local fishers practice well developed local "chum feed and net" fishing techniques, which appear sustainable;
- Formerly, the Gazankulu Homeland government gave permits for use of fishing rods, but now fishers go through the local leadership to ask for permission, more especially the outsiders. The Makuleke case therefore presents a useful example of local innovation and application of common pool rights.
- Active fishery management by means of recreational permits has *de facto* fallen away and, in their stead, local informal governance arrangements have emerged and are actively used to manage the common pool resource;

- Existing gear restrictions by the Limpopo Environmental Management Act, which limit fishers to the use of hook and line, are no longer relevant to local usage patterns;
- Subsistence fishing use is regarded as legitimate by local traditional and CPA authorities as a livelihood;
- Local fishers have some local informal management organisations, such as “fishing spots”, whose access is recognized among local fishers to be the preserve of those who have already staked
  their claim and utilize them regularly. Those with established fishing spots can exclude others from access to these, and such exclusion is considered legitimate by other local fishers;
- While local fishers largely comply with the informal access rules, outsiders are often unaware of such arrangements and this compels local fishers to enforce the rules, often through non-violent means, since outsiders generally comply when they are made aware of their inadvertent infringements of existing local arrangements;
- Although local subsistence/artisanal fishers generally accept similar outsider fishers, they take exception to the use of the fishery by outsiders who “excessively” harvest the fishery using selective gill nets and boats, primarily for commercial purposes;
- Apart from concerns about decimation of fish populations and threats to local livelihoods, conflicts between local subsistence/artisanal fishers and outsider commercial fishers relate, firstly to incompatibility of harvesting methods (especially gill net and motor-boat versus seine net use) and, secondly, competition over local informal markets (gill net users having “unfair” advantage and taking away subsistence fishers’ customers);
- While local fishers frown upon motor-boat based fishing, they have no power to control other than to appeal to local traditional and CPA authorities;
- Local traditional and CPA authorities have intervened by prohibiting the use of fishing boats, requiring outsiders to ask for permission before gaining access to the fishery, charging outsiders an access fee and arresting any outsiders who contravene the local rules; in essence, there is a strong sense of a common pool resource, whereby outsiders who respect local protocols and access and use rules and preferences are accepted or tolerated, but those who do not are unwelcome. Generally, however, outsiders do not resist local rules since they understand that they are in “other people’s land” and therefore need to respect local protocols. Makuleke Tribal Authority control over land surrounding Makuleke Dam facilitates local management of the fishery;
- There is a sense among local fishers that they control the fish population, which seems to be linked to perceptions about avoidance of excessive harvesting and assisting with the control of access by outsiders, particularly those using boats and large selective nets. In the absence of any clear guidelines regarding catch size, for example, it is not clear whether or not local fishers – who are invariably resource poor – would maintain their stance to avoid excessive fishing if they acquired the resources to conduct harvesting at a large scale.
- It appears that there is no responsible authority clearly tasked with managing the dam. This accounts for the voiced perception that “‘government’ is out there, only knowing the dam on the map”. There seems to be a need to build upon existing informal institutional arrangement and develop requisite management capacity and governance arrangements;
- Towards the development of local management capacity, insights on current roles played by the agricultural extension officer in Makuleke community suggest that extension staff such as this could be used by DAFF as future fishery extension officers. Extension officers already work with the communities and would therefore merely require an expansion of roles and responsibilities, through training in fishery issues, which is cost effective. They would play a developmental role as opposed to the “rangers” compliance and enforcement role.
- A strong view by local leadership and institutional stakeholders is that the use of Makuleke Dam for fishery development will be acceptable if access to the fishery is well-managed and if the revenue generated from locally-issued fishing permits is used to contribute to community upliftment.

7.7 References and Bibliography

Tapela, B. N. 2009. *Water Rights in Informal Economies: Report One on A Case Study of Makuleke Community in Limpopo Province of South Africa.* First of four research reports produced under the South

African Component of the Consultative Group for International Agricultural Research (CGIAR) Challenge Programme for Water and Food (Project 66).

Tapela, B. N.,Buschër, B., Maluleke, L., Twine, W. & Steenkamp, C. 2009. *Guidelines for Negotiating Social Research in Communities living adjacent to Transboundary Protected Areas: Kruger National Pa*rk. University of Johannesburg. Johannesburg. ISBN 978-0-86970-668-8.

Tapela, B. N., Maluleke, L. & Mavhunga, C. 2007. New Architecture, Old Agendas: Perspectives on Social Research in Rural Communities Neighbouring the Kruger National Park. In Conservation and Society. Special Issue: *Politics of Engagement between Biodiversity Conservation and Social Sciences*. 5 (1), Page numbers

Tapela, B. N. 2001. *Community Participation in Natural Resources Management: Case Study of Makuleke Community*. Unpublished MA dissertation (cum laude), Geography Department, University of Pretoria, South Africa.

Tapela, B. N. & Omara-Ojungu, P. H. 1999. Towards Bridging the Gulf between Wildlife Conservation and Rural Development in Post-Apartheid South Africa: The Case of the Makuleke Community and the Kruger National Park. In *South African Geographical Journal* 82(1): 148 – 155.

Tapela, B. N. 1999. Makuleke: A Gender-Sensitive Analysis of Community Participation in an Integrated Conservation and Development Programme. In: Fairhurst, J., Musyoki, A., Wilson, D. & Saidi, T. (Eds.) *Integrating Environment and Society: The Thohoyandou Environs, Northern Province, South Africa.* Centre for Science Development (CSD) Collaborative Research Project, University of Pretoria and University of Venda. 179 –188.

8 MIDDLE LETABA DAM, LIMPOPO PROVINCE

Figure 23 The road to Middle Letaba Dam

8.1 Introduction

The research was undertaken on the 18th and 19th of March 2011 by prospective PhD student Vimbai Rachel Jenjezwa and research assistant, Attorney Gezane Hlongwane. In order to prepare for community entry, the assistant researcher undertook some preliminary research about the area and its people. The research assistant performed a preliminary survey and met with the Chief of the area to introduce the research team. He told the Chief that researchers would be visiting the community and dam to find out about their fishing practices and techniques.

8.2 Methodology

The research methodology used was questionnaires and interviews. A focus group interview was held with the leaders from some villages which depend on the dam. Information was gathered from fishers using interviews for groups of fishers and questionnaires for single fishers. The questions for fishers were the same regardless of whether it was a group or individual. The researcher complied with ethical guidelines for social research by explaining the purpose of the research and assuring the participants that the information that they supplied would not be used for anything other than research on inland fisheries. The participants were also informed that they were free not to divulge any information that they were not comfortable with providing. Prior to meeting with the fishers, the researchers met with the Chief to gain permission to interview people, in particular fishers at the Middle Letaba Dam. The researchers then explained what the research was about and what sort of questions they would be asking.

The problems encountered when undertaking fieldwork included locating only a few fishers at the dam, which the researchers attributed to the fish mortalities at the time[36]. The researchers also did not manage to interview anyone from the recreational fishing camp which is located south west of the Middle Letaba Dam wall (Figure 24).

Figure 24 Recreational Fishing Camp at Middle Letaba Dam

[36] The view of the LEDET Environmental Compliance and Enforcement officer based at Flag Boshielo Dam was that commercial fishers from areas around Tzaneen, Phalaborwa and Louis Trichardt had decimated fish populations in dams such as Middle Letaba and Nandoni and are hence coming to fish in Flag Boshielo.

8.3 Background to the Study Area

8.3.1 Location

The Middle Letaba Dam is located in the Greater Giyani Municipality which falls under the Mopani District Municipality of the Limpopo Province. The Mopani District is in the north eastern part of Limpopo province. In the Greater Giyani Municipality, the biggest town is Giyani. The dam wall lies 29 kilometres from Giyani (the nearest town), along the R578. There are 91 rural villages and 7 townships. The Dam lies along the border of Wards 2 and 3 of the Greater Giyani Municipality. The main part of the dam is within the Ndengeza Council Area. The villages surrounding the dam include Babangu, Phikela, Ndengeza, Noblehoek and Ximausa. The land use types in and around the dam are recreational, agriculture (including fisheries) and settlement (Greater Giyani Municipality; ***Basemap,*** 2009).

8.3.2 Socioeconomic Profile

Greater Giyani Municipality mainly has both formal and informal economic activity. The activities include small-scale agriculture, services, transport and retail development. However, factors such as geographical location, shortage of skills, poor infrastructure, climatic conditions and diseases, impact negatively on economic development (Greater Giyani Municipality).

Based on the 2001 Census and 2007 community survey, Greater Giyani Municipality has a mixed population and Xitsonga is the most dominant language, followed by Northern Sotho and a little bit of Venda. The population mainly comprises of Africans (99.75%), and a few whites (0.17%), coloureds (0.04%) and Indians (0.05%). The majority of people in the municipality (41.97%) are younger than 15, followed by the 15 – 34 age bracket which makes up 35.7% of the population. Therefore, Greater Giyani has a youthful population. In 2001, the majority (74.4%) of those between 5 and 24 years did not attend school. 22.6 % of the population in this age bracket did not attend any educational institutions possibly due to poor accessibility of schools and poverty affecting people's ability to afford educational institutions. In 2001, 78.04% of people in Municipality did not earn an income (Greater Giyani Municipality).

Sanitation is a major problem thereby affecting underground water. Most of the people within the Municipal jurisdiction area use pit latrines (22.5% in 2001) without ventilation while others have no sanitation facilities at all (54.9% in 2001). The lack of waterborne sewerage system leads to the contamination of groundwater. Some rural settlements do not have access to water at all and fetch drinking water from wells, pits or rivers. Lack of access to this adequate portable water affects health standards as diseases such as cholera can be contracted (Greater Giyani Municipality).

Due to low summer rainfall, people in the Greater Giyani Municipality often face droughts and water shortages.

8.4 History and Management of Inland Fishery

The Middle Letaba Dam is a water scheme that was developed in the late 1970's in order to supply water to the domestic and agricultural sectors. Since then, domestic water supply has increased significantly and affects water supply to irrigation schemes downstream. According to the Department of Water Affairs, the Middle Letaba Dam is dam number B800-29. It was completed in 1984 and has a capacity of 173 128 000 cubic metres. The dam is fed by Middle Letaba River, the Koedoes River, Brandboontjies River and minor streams. The dam was built by the state and belongs to the Department of Water Affairs. By 1998 only 1 360ha of the 2400ha of land earmarked for irrigation was utilized (DWAF, 2004a;b).

Although most irrigation in the area occurred upstream of the dam, there was also irrigation of vegetables and fruits downstream. Irrigation downstream decreased significantly apparently due to decreasing assurance of supply as more and more of the yield of the Middle Letaba Dam was supplied to Giyani and other towns for domestic use. The estimates for water supply were much higher than was available; therefore irrigation schemes downstream were experiencing deficits. Water conservation and demand management measures have been implemented in the Giyani area in order to help solve the problem with water supply.

The Middle Letaba Dam delivers water to the Nsami Dam through a 60 kilometre concrete canal. The Middle Letaba Dam had steeply rising trends in salt concentrations, calcium, chloride, magnesium and sodium. The acidity averaged 8.2. Although this was an acceptable level, the increasing trend was of concern. The possible cause of the trend was irrigation practices upstream of the dam, but the issue required further investigation. Declining quality was also evident at Nsami Dam, although irrigation and drinking water guidelines were not exceeded.

8.5 Characterization of Indigenous Knowledge and Current Fishing Practices and Techniques

8.5.1 Findings from Key Local Stakeholder Organisations

The researchers interviewed the Chief of Xihimu, who was not a fisher himself (Figure 25). The Chief's two advisors were present, and a village elder later joined in the discussion.

The Chief heads over five indunas for the sub-villages which are Mudono, Mangove, Mangurwana, Mbungwana and Nkanyana. He said the Dam is surrounded by Ndengeza (sub-divided into suburbs known as Block C, Phikela and Rivala) and Msengi (sub-divided into Ximausa and Noblehoek). All these villages and their sub-divisions depend on the dam for household water, fishing and water for their livestock. Some people have bore holes at their homesteads which are used for household uses and watering gardens. However, people did not swim in the dam. Some people used boats in the dam but these were usually outsiders (recreational fishers). In order to fish in the dam, some fishers seek permission from the Chief whilst others get permission from the recreational fishing camp[37] (see Figure 5.16). The fishing camp is located south west of the dam wall. The researchers do not manage to gain access to the fishing camp hence little is known about it. Before 1994, people would get permission from the Magistrate. The Magistrate gave fishers permits but does not do so anymore.

Figure 25 Middle Letaba: Chief Shondlani and two members of his advisory council

The Chief was consulted before the Middle Letaba Dam was constructed. Before the dam was built, people did not fish in the river. The Chief said that people did not wash clothes in the dam, however, the researchers observed a group of women washing clothes by the bank. The Chief does not fish because he is afraid of crocodiles. However, no-one has ever been attacked or killed by the crocodiles. He said some people were not afraid and would even go into the water until they were chest deep. The chief said that before the dam was built, there were no crocodiles but afterwards there have been crocodiles. He said crocodiles can smell the water so they came in when the dam was built. The elderly men thought that some people in the area thought that the crocodiles had been brought into the dam but they did not specify who they suspected to have done this. He worked on the construction of the dam wall. Some people died mainly from drowning during the dam construction. The deep part of the dam is called Deep Level. He used to fish in the dam using a fishing rod but stopped because of the crocodiles.

8.5.2 Findings from Rapid Appraisals of Fishers and Local Key Respondents

Researchers interviewed fishers found at the dam. On the first day of field research (18 March 2011), researchers interviewed a group of two families and a local male fisher along the banks of Middle Letaba Dam. The male fisher mostly caught bream, while the two fishing families did not seem to have any particular preference or knowledge about names of the fish species found in the dam. Indeed, there seemed to be a

[37] This was a formal fishing camp, with well-constructed buildings within a secure electrified perimeter fence.

general lack of knowledge about fish species and fishery management among members of local communities. An elderly white male recreational angler, who was the only fisher interviewed on the 19th of March, stated that he specialized in catching bass and carp. There were no other fishers on the northern side of the dam. This could be attributed to the weather, which was cloudy and drizzly. The scarcity of fishers could also be due to fishers' concerns about dying fish. However, it is also possible that Middle Letaba Dam fisheries have been decimated by excessive commercial harvesting. Such possibility is based on statements by Chief Shondlani and his elders that commercial, recreational and subsistence fishing takes place in the dam. The possibility is also based on a view by LEDET's environmental compliance and enforcement officer at Flag Boshielo Dam that commercial fishers from areas around Tzaneen, Phalaborwa and Louis Trichardt had decimated fish populations in dams such as Middle Letaba and Nandoni and are hence coming to fish in Flag Boshielo. On the far side of the dam, researchers saw some people but it was not clear as to what they were doing. Women were also seen washing clothes by the bank. They did not pour the dirty water into the dam but onto the bank. However, boxes of washing powder were also seen on the banks as well as in the dam water. There were nets in the deeper portions of the dam. A lot of dead fish of different species had been washed onto the banks. Litter, which included fishing nets and rods, bottles and papers, was also found on the bank.

While the research identified three species that recreational anglers and subsistence fishers specialized in, which include carp, bass and bream, it was not possible to determine the full diversity of fish species within Middle Letaba Dam fisheries. Attempts to speak to someone at the fishing camp next to the dam were not fruitful. Although researchers saw people in the fishing camp, these were not responsive and this made it impossible to get any information about the fishing camp.

Indigenous Knowledge, Fishing Techniques and Objectives

Findings from a focus group discussion with the Chief and elders were that, historically, fish were caught in summer (the rainy season) and not in winter because the fish went deep down into the bed. In the past, fish were caught by tying leaf branches together to make traps about six metres long and then the fishers would get inside the water and push the leaf 'net' towards the bank thereby catching fish. The leaves were from the *xitomatomana* bush. The word *xitomatomana* is derived from the word *ntoma*, which is the Tsonga term for the jackal berry tree. When nets became easily accessible and affordable, fishers began using nets and discarded the leaf net method. Women also fish and mostly use nets whilst men use rods and seine nets. There are no rituals performed before fishing and this has been the case since fishing began in the area. Fishing is undertaken for commercial, subsistence and recreational purposes.

Informal Recreational Fishing Practices and Techniques by Local People

On the first day of field research, researchers found a group of people, which consisted of two families, by the banks of Middle Letaba Dam. One of the elderly women was collecting vegetables, which only grow on the banks, and catching grasshoppers. A younger woman of about twenty (20) years of age was catching fish using a trap made of shade-cloth netting (Figure 26). She demonstrated the technique that she used to catch fish. She first put stiff pap and a stone in the bottom part of the trap. The stiff pap was bait whilst the stone weighted down the trap so that it sank onto the bed. The trap had a rope attached, which she used to lower the baited trap

Figure 26 Middle Letaba: Female subsistence fisher demonstrating use of a home-made fish trap

Figure 27 Mid-Letaba: Subsistence fisher using one of his self-made fishing rods

into the water. When fish entered the trap, she would quickly pull out the trap. Fishing activities for this group of local people were part of a day spent in recreation on the banks of Middle Letaba Dam.

Subsistence fisher

A male fisherman who was born in 1949, was fishing found at the dam using fishing rods, and stiff pap and earthworms as bait (Figure 27). On the day of the interview, he had eight (8) rods in the water and two (2) others on standby on the bank. The fishing rods were made of bamboo with twine tied on one end. He tied some of his fishing rods to the grass so that if a big fish got caught, it would not pull the rod into the water. He said he did not have any traditional knowledge but was taught how to fish by his father. He had been fishing since he was a young boy. No one else in his family fished. The other fishers he knew are both male and female of all ages and financial statuses, and these include insiders and outsiders (i.e. members and non-members of local rural communities). He fishes for commercial and subsistence purposes. The main species he catches is bream. He catches fish twice or thrice a week, which sometimes includes weekends, when he has enough bait. He usually goes fishing between nine (0900 hours) and eleven (1100 hours) in the morning and leaves the dam in the afternoon after he has cleaned his fish. He mostly fishes in summer and at times in winter, but rarely so because earthworms are scarce.

The subsistence fisher sold his fish, mainly bream, along the main road between Giyani and Elim (i.e. the R578). He never shares the leftover fish with friends. His selling price starts at R10 for 3 “big” (i.e. about 15 cm long) fish. He prepares the fish by gutting and cleaning them (Figure 28). The fish shown in Figure 26 were his catch for the day. He said he had arrived at the dam at around 9 o’clock in the morning and would leave after he had prepared the fish for sale. He could not say how much he earned per month because he said that he often used the money to buy alcohol.

Regarding organisation of fishing, the fisher said that fishing is not organised at the moment. In the past, fishers paid for permits at Magoro Magistrate Court. However, at present, none of the fishers paid for permits. The fisherman did not know of any rules regarding fishing but at times field rangers visited the area. The field rangers do not allow casting of nets because the nets catch a lot of fish. The white recreational angler interviewed said that the locals were not organised but did not give a reason why he believed so.

Figure 28 Mid-Letaba: Subsistence fisher demonstrates preparation of fish for sale

The respondent’s main concern was about dying fish. He said that he had noticed the dead fish two weeks before (on 18 March 2011). No one including the Chief knew what was causing the fish to die. George had no concerns about personal safety and security.

Formal Recreational Angling Practices

A white man aged between 46 and 60 years of age was at the dam fishing for recreational purposes. He catches and releases the fish. He said that he has been fishing for 40 years. He catches carp and bass using a rod and reel, and owns a boat (Figure 29). He went fishing between five (5) and eight (8) times a year over weekends and in both summer and winter. Although he was the only fisherman interviewed on the 19th of March, the respondent said that other male recreational anglers also fished at the dam.

Figure 29 Mid-Letaba: Fishing gear and tackle of a white recreational angler

Regarding organisation of fishing, the recreational angler said that local fishers were not organised. However, he did not give a reason why he believed so. The respondent was concerned about the use of nets because he believed that they caused over-fishing. His other concerns were water pollution and crime.

Marketing of Fish

According to members of local communities, who were randomly interviewed in the vicinity of the dam, fish were mainly sold along the road or from the fishers' homes. This was confirmed by the white recreational angler, who had seen locals selling fish by the roadside, who himself sold fish along the main road. The Chief of the Xihimu Community said that he bought fish from fishermen's homes. He said that people rarely slaughter livestock for meat hence fish is the main source of protein. The main fish species caught and sold are bream/ tilapia. The price of fish ranges from R10 for small fish to R30 for big fish. It also depends on the seller, with some sellers being more expensive than others. Fishers store the caught fish in refrigerators and do not smoke or dry the fish. The fish used to be dried in the past when people did not have fridges. A woman said that fish were sold for R20 for 6 big ones, which resonates with what was said in the first focus group discussion.

8.6 Discussion and Conclusion

Middle Letaba Dam provides an essential resource of water for various purposes as well as food in the form of fish. Both the locals and outsiders use the dam for subsistence, commercial and recreational purposes. The outsiders mainly used the dam for recreational purposes.

Evidence showed that traditional fishing techniques are disappearing with the emergence of current commercial, recreational and subsistence practices and techniques. Among subsistence techniques, for example, the traditional leaf 'net' or *xitomatomana* has become replaced by fishing rods, newer types of nets (e.g. seine nets) and traps that are made partially or entirely of store-bought raw material. Findings also suggest that recreational anglers use more sophisticated store-bought fishing rods and boats relative to the gear and tackle used by subsistence fishers. It is reasonable to assume therefore that socio-economic differentiation between recreational anglers and subsistence fishers goes beyond superficial racial appearances and more critically revolves around the disjunctures of wealth and poverty. Recreational anglers are relatively more affluent while subsistence fishers, who are resource-poor.

Despite finding no commercial fishers on the dam, cross-referencing with findings from Flag Boshielo suggested that the fishers used to operate at a larger scale, use gill nets and boats, are mostly black and generally make significant investments in various resources required to operate such enterprises. Without data to enhance understandings of how the informal commercial fishing value chain is organized and who are the other 'invisible stakeholders (e.g. enterprise owners, fish buyers, processors and/or marketers), it is not useful to infer and ascribe any socio-economic characterization to the visible fishers.

The main issues of concern regarding this case study were the local fishers' poor knowledge of fish species in the dam, purported lack of information about commercial fishing practices, the lack of a sense of a 'common pool resource' and therefore no sense of shared responsibility for managing the resource. Other issues were the lack of visible dam management, water pollution and contamination, littering and the current mortality of fish. No formal fishery management and no local fishery governance institutions were recorded. There were also no apparent conflicts between the different fishery resource users.

In examining possible interventions, it is worth noting that the diversity of users and uses of Middle Letaba Dam means that no single authority can be expected to effectively assume and execute responsibility for managing the dam fisheries. Whereas before 1994, people used to get fishing permits from the Magistrate's office, this office does not issue such permits anymore. Currently, there do not seem to be any clear protocols around access to the dam fisheries. Local subsistence fishers generally do not have to ask for permission from the chief or the fishing camp. Outsiders namely, recreational anglers, use boats in the dam and do not have to seek permission from Chief Shondlani. Other outsider fishers seek permission from the Chief whilst others get permission from the recreational fishing camp[38]. It is not clear what institutional arrangements the fishing camp uses to issue permits.

With regards to the dying fish, there seems to be an urgent need for the responsible authorities, such as LEDET, local traditional leadership and the Department of Water Affairs, to work together to find out what is causing the death of fish and to stop the cause. Although causal factors might probably include water pollution and contamination in the area and/or commercial fishing practices, at present, there is no known reason for the death of fish. The issue of fish deaths underscores the need to establish a clear responsible authority for managing the dam.

While the fishing camp does not seem to play any role in dam management, it could be the best place for fisher education and fishery management. The camp could also serve as a local base for monitoring fishing activities in the dam, identifying problems such as dying fish and reporting such problems to responsible authorities at higher levels. Further research needs to investigate how the community could be involved in fishery resource management and what is causing the fish deaths.

8.7 References and Bibliography

Greater Giyani Municipality Adopted Integrated Development Plan 2010 -2013. Retrieved from ***http://www.greatergiyani.gov.za/*** on 12 April 2011.

http://www.demarcation.org.za/pages/default_new.html (Accessed 12 April 2011)

Department of Water Affairs and Forestry, South Africa. 2004. *Internal Strategic Perspective: Limpopo Water Management Area*. Prepared by Goba Moahloli Keeve Steyn (Pty) Ltd, in association with Tlou & Matji (Pty) Ltd and Golder Associates (Pty) Ltd. on behalf of the Directorate: National Water Resource Planning. Report No. P WMA 01/000/00/0304. Retrieved from ***http://www.ewisa.co.za/misc/RiverLimpopo/defaultdam.htm 14 April 2011***

Department of Water Affairs and Forestry, South Africa. 2004. *Luvuvhu/Letaba*

Water Management Area: Internal Strategic Perspective. Prepared by Goba

Moahloli Keeve Steyn (Pty) Ltd in association with Tlou and Matji, Golder

Associates Africa and BKS on behalf of the Directorate: National Water Resource

Planning. DWAF Report No. P WMA 02/000/00/0304.

[38] This was a formal fishing camp, with well-constructed buildings within a secure electrified perimeter fence.

9 LAKE FUNDUDZI, LIMPOPO PROVINCE

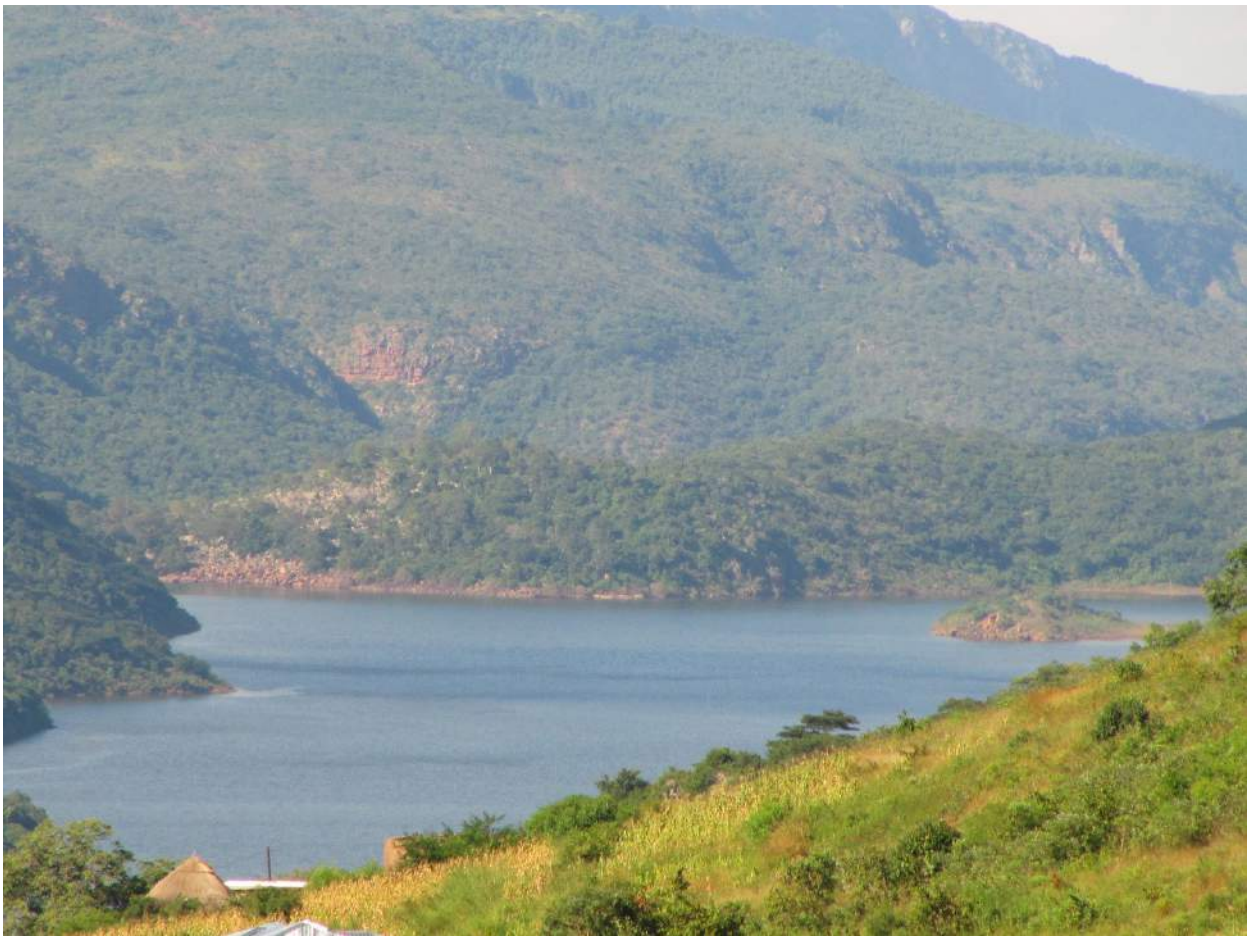

Figure 30 Traditional custodian of Lake Fundudzi: Chief Netshiavha

9.1 Introduction

A field survey research was conducted in order to obtain useful qualitative and quantitative insights through rapid appraisals of fishers and rural fishing communities. Ms Rozwivhona Magoba and Mr Attorney Hlongwane undertook a field survey in Lake Fundudzi and the neighbouring Thononda village on the 27th and 28th of March 2011.

9.2 Methodology

Field research was conducted in order to obtain useful qualitative and quantitative insights through rapid appraisals of fishers and the rural fishing community of the Thononda village. The survey was undertaken over two days, of which one was a week day and the other a weekend day. The objective was to capture the views of fishers who frequent the lake on week days and/or during weekends. Information was collected through interviews with individuals renowned to be fishers within the community as well as other fishers found fishing in the lake on the days of field research. Primary data was also collected through interviews with the some of the community elders, the chief and selected key respondents from Thononda Community. Secondary data was collected from other key resource persons, who knew about fishing practices prevailing in the Lake Fundudzi area. The questions were administered to the fishers directly and were structured in a way to capture their socioeconomic profiles such as their age, gender, household compositions / characterization, employment status and monthly income levels.

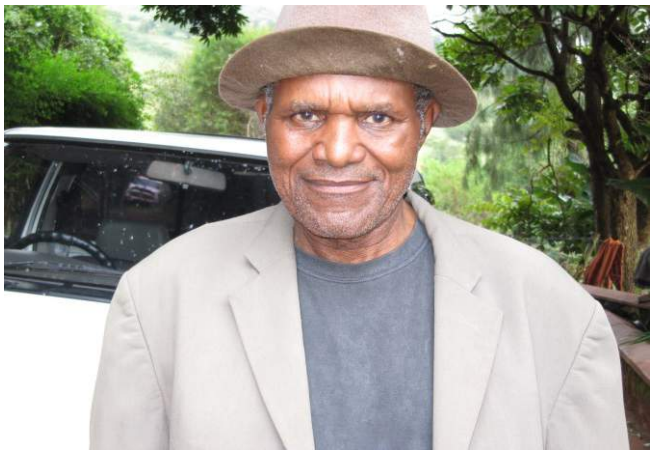

Figure 31 Traditional custodian of Lake Fundudzi: Chief Netshiavha

Towards preparation for rural community entry, the team had to ask for permission from Chief Netshiavha of Tshiavha Village (Figure 31) as form of paying respect and following protocols, as he is the custodian of the lake[39]. The team went to Tshiavha village to meet with Chief Netshiavha, who was an elderly man aged between sixty (60) and sixty-five (65) years. To show respect, according to Venda culture, the team went down on their knees when he approached. Researchers introduced themselves and explained to the chief the aim of the visit, which was to request permission to conduct research. They also gave him an idea of the sort of questions which would be asked. Chief Netshiavha was keenly interested in the research and could not wait for researchers to ask him questions. He immediately began telling the team that it was in his interest that people should not fish in the lake, more especially the net users. He also emphasized that conservation of the natural environment around the lake is all that his heart is desires.

He told the research team that his main concern is with the over-harvesting of fish and indigenous plants. The chief demonstrated his love for nature by showing researchers trees around his yard. He pointed out various indigenous trees, such as the White Wild Buck, Crown, Fig tree, Mahogany, wild Tobacco and the African Flame tree. The chief then granted researchers his permission to visit the lake and to talk to his people.

9.3 Background to the Study Area

9.3.1 Location

Lake Fundudzi is a relatively large natural lake located in the Nzhelele valley in the northern parts of Limpopo Province. The lake is three (3) kilometres long and has a surface area of 144 hectares and a maximum depth of 27 metres (Van Der Waal 1997 in Khorommbi, 2000). The lake is surrounded by Venda-speaking rural communities of the Vhathavhatsindi group, who settled in the area a number of generations ago.

9.3.2 Socio-economic Profile

Researchers focused on Tshiavha and Thononda B communities. These are both rural communities with small and scattered populations. According to Department of Water Affairs (DWA) water and sanitation records, Tshiavha and Thononda B have a population of eighty-one (81) and seventy-three (73) households respectively.

Most (66) of the households of Tshiavha have access to water at above Reconstruction and Development Programme (RDP) level and fewer (25) have water services below RDP level. Access to sanitation services is poor, with less than half (32 out of 81) of the households in Tshiavha said to have sanitation services at greater than RDP level while the majority (59) has sanitation below RDP. By contrast, the majority (63) of households Thononda B has access to water at above Reconstruction and Development Programme (RDP) level and fewer (10) have water services below RDP level. Access to sanitation services is poor, with less than half (27 out of 73) of the households in Tshiavha said to have sanitation services at greater than RDP level while the majority (46) has sanitation below RDP. Water and sanitation records for both communities therefore show that more than 80% of the total population has water services above RDP standards while more than 63% has sanitation services below RDP levels.

[39] The approach was informed by recognition that it is important for researchers to make themselves and their prospective work known to community leadership, especially in rural areas. Observance of local protocols makes community entry and the conduct of research much easier, since doing so makes the leadership feel honoured and respected in their rightful place. Observance of community entry protocols is also in compliance with ethical guidelines for social research in rural communities (see Tapela *et al.*, 2007).

9.4 History and Management of The Fishery

Lake Fundudzi is one of the few natural fresh water lakes in the southern hemisphere. The Venda tribe considers the lake sacred, especially the Vhatavhatsindi clan who acts as the custodians of the lake. Vhatavhatsindi royal families practice their religious rituals and burial customs in and around the lake, such traditional practices have given the lake and its hinterland a protected status that limited exploitation of natural resources by surrounding communities for many years. Chief Netshiavha confirmed, however, an observation by Khorommbi (2000) that traditional beliefs and taboos associated with the lake are no longer strictly enforced and this has resulted in the increased utilization of resources in areas that were not previously exploited.

According to Chief Netshiavha, Lake Fundudzi was discovered by the Netshiavha ancestors centuries ago. Since then, the Netshiavha chieftainship has held custodianship over preservation of the ecological, cultural and spiritual integrity of the lake. As such, the chief was very keen to keep the lake virgin or natural, without disturbance to the surrounding environment and lake ecosystem as whole. During the survey, all respondents made it clear to the research team that the only people who have control over the lake are Chief Netshiavha and the Netshiavha Royal Family, and not government. Given the widely-held local beliefs that Netshiavha Royal Family has all the power and custodianship over the lake, this key primary stakeholder and indeed the whole traditional institutional set-up around Lake Fundudzi need to be considered in processes to formulate new institutional arrangements for inland fisheries.

Chief Netshiavha stated that he personally does not want any developments that will disturb the natural state of the area. He further said that he does not want the lake to be disturbed at all since it is very important to the Netshiavhas. He is also worried about the over-harvesting of some of the indigenous tree species found in this area such as White bark (*Mulanga*), fig tree (*muhuyu*), yellow wood (*mufhanza*), mahogany (*mutulu*) and some crown trees.

Chief Netshiavha also reported that a lot of development proposals for the lake had been presented to the family but as yet no development projects had begun. The Chief believed that sooner or later the lake would be declared a world heritage site. He did not anticipate any changes to the long-enduring traditional institutional arrangements for the governance of Lake Fundudzi as a result of such declaration. Rather, he seemed to view the declaration as a means towards halting threats to the ecological and cultural integrity of the lake.

9.5 Characterisation of Indigenous Knowedge and Current Fishing Practises and Techniques

9.5.1 Finding from Local Stakeholder Organisations

Chief Netshiavha was the key respondent on behalf of locally-based organisations around the lake. Researchers were not able, however, to identify any other formal or informal stakeholder organisations –other than the Netshiavha Royal Family – within the vicinity of the lake. The short duration of the field survey presented time constraints for researchers to build sufficient trust and confidence for local people to communicate more openly.

9.5.2 Findings from Rapid Appraisal of Fishers and Local Key Respondents

Following the introductory meeting with Chief Netshiavha, the research team drove with great hope to meet with the man whom the chief described as a well-known fisher (who subsequently refused to assist researchers). They came across a group of men along the way. When researchers asked for directions to the fisher's house, two men aged between thirty (30) and forty (40) came forward to meet the team. They both revealed that they were also fishers and could take the team to the man's house. When the team arrived at the man's house, he ignored the researchers and refused to even meet and/or greet the team, saying he was too busy to talk[40]. Consequently, the first interview was conducted with the two men accompanying researchers.

[40] See also the last paragraph in Section 8.1.1.

Figure 32 Lake Fundudzi: Subsistence fisher

Subsistence Fishers

Two fishers were interviewed (Figure 32). The first was from a household of four (4) people, and the second from a household of five (5) people of whom two (2) adults were jobless. None of the adult members of both households is employed, and the two fishers were unemployed and did piece jobs for a living. They both started fishing when they were young boys. Their fathers taught them how to fish. As far as they could remember, they their fathers had been fishing in Lake Fundudzi.

The fishers both made it clear that there are no rules and regulations that prevent them from fishing in the lake. Men and women do fish. The respondents also told the team that there is no danger fishing in the lake. They personally feel safe even if they are fishing alone. The lake has crocodiles but they are not dangerous because they eat enough fish. There also used to be hippopotamus before but now these had since disappeared. The fishers stated that hippos were not dangerous. They also mentioned that there are seven kinds of fish species in the lake and all are edible.

After the interview, the fishers guided the research team to the lake for field observations. A number of people were found fishing at the lake, but these were few. The researchers observed and interviewed these fishers.

9.6 Subsistence and Recreational Fishing and Cultural Beliefs Around Lake Fundudzi: Overview

According to respondent fishers found at Lake Fundudzi, the main uses of the lake are currently swimming (not much), fishing, drinking (only when people are at the lake side) and cooking fish only when fishers are at the lake. People do not carry the water home, in compliance with cultural norms. Some people believe the water has got healing powers (i.e. for *ndaela*), so they come and get the water from the lake. The water is also believed to be medicinal. Respondents stated that if a person has a wound and sits in the water for few hours, the next day the wound will start to get dry. A common belief, which respondents said was based on long term observation, was that the lake has its own self-cleaning mechanism and does not keep rubbish and dead things in it. Like the sea, it throws out any rubbish or dead things that might be in the water. Most of those interviewed said that they had started fishing at a young age and their fathers had taught them. Indeed, fishing seemed to be a generational thing as most of the men found fishing were also teaching their children how to fish. They had brought their children along to catch fish in the lake.

Fishers confirmed the statement by Nethwadzi and Peter that there are seven kinds of edible fish found in Lake Fundudzi. They said these are *Tshikwea* (Mozambique tilapia), *Thanzwana* (Threespot Bream), *Thanzwi* (Largescale Yellowfish), *kappa* (Carp), *khunga* (eel), *Pulisani* and *Nemulambo*. The threespot bream is considered to be the tastiest fish in the lake, especially if water from Lake Fundudzi is used to cook it. The fish is oily and has few bones, making it more enjoyable. Although all fish from the lake are edible, local people do not like the eel since it looks like a snake. Earthworms, pap (*vhuswa*), clay (*vumba*), plastic bait and *Nemeneme* (small soft termite-like insects that are eaten with porridge) are used to lure the fish.

From field observations, fishers at Lake Fundudzi use fishing rods with hooks (*Tshinjovho*) and only a few use casting nets (*Mambule*). Those using the nets can only do so when standing at waist level in the water and they have to remain close to the banks of the lake (Figure 33). The fishers say the lake has a lot of fish but it is hard to catch the large ones. Hence, their catch mostly consists of smaller fish of 15 to 20cm in length. Sometimes fishers catch larger fish of around 30cm in length.

All interviewed fishers agreed that the best fishing season is summer. This is because summers are hot so the fish come out of deeper water for sunlight. In winter the fish hibernate in deep waters. Most of the Lake Fundudzi fishers go fishing four (4) days a week and for at least six (6) hours each day. Time and effort spent fishing does not bother the fishers since they really enjoy the activity. Respondents said they fish for food mainly and also to pass time when bored. Fish is sometimes dried and kept for future use in the house.

They might also sell the fish at times, when someone wants to buy. However, they do not necessarily have markets in which they sell fish. When fish is sold, prices range from R6.00 for small ones to R30.00 for the bigger fish. Fishing is usually done in the early mornings around half past six (0630 hours) until late in the mornings. The rationale was that fish are "quiet" during the day.

Figure 33 Subsistence fishers using a net fishing technique in Lake Fundudzi

Unlike night-time fishing practices observed in cases such as Phongolo, Makuleke, Nandoni and others, Lake Fundudzi the fishers seem ed to restrict their fishing activities to morning and daytime. This seemed to be related to cultural beliefs and legends pertaining to the lake. During the field survey, researchers met a tourist, who said he loved traveling and seeing places but Lake Fundudzi scared him. For security reasons, the tourist was being accompanied by two boys and he carried a rifle. He said that many years ago, people used to hear Venda traditional music (*Tshikona* and *Tshigombela*) playing in the lake at night. They used to hear the drum beat of that music. Such beliefs might explain why Lake Fundudzi fishers do not venture close to the lake at night.

Respondents also alluded to purely recreational fishing activities by some of the local people. These take containers of pap (stiff maize porridge or *buswa*), go fishing in the morning and spend the whole day catching fish at the lake, which they braai and eat with pap by the lake side (Figure 34). Fishers said that fish eaten by the lake side is for them the most delicious dish ever.

In terms of local norms, respondents said that all people are allowed to fish, including local male and female fishers as well as outsiders. Hence, apart from residents from rural communities adjacent to the lake, such as Thononda and Tshiavha, people come to fish from the more distant neighboring villages, such as Dopeni, Khalavha, Tshixhwadza, Dzimauli and many others. Local fishers do not have any problem sharing the lake with people from outsiders, from other villages. They also emphasized that fish from Lake Fundudzi is only good when cooked using lake water.

None of the fishers had fishing licenses. Respondents said that nature conservation officials sometimes come and tell them not to fish but not necessarily to arrest them. Fishers' were concerned about the fact that when these officials come, they take away their fishing gear as well as their fish. In particular, fishers felt aggrieved about the perceived confiscation of fish for the officials' own personal consumption.

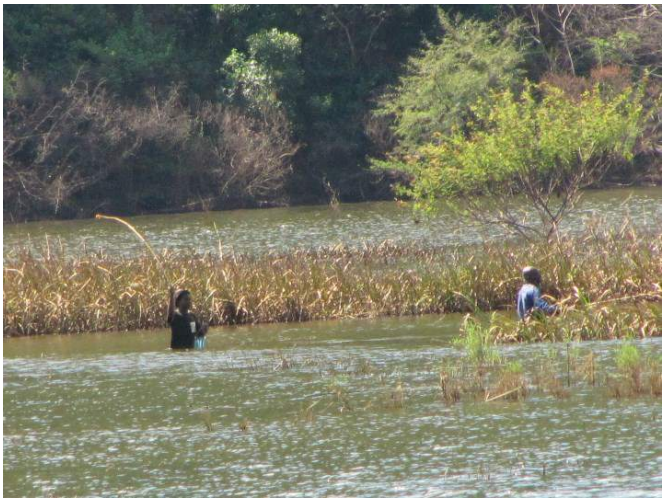

Figure 34 Recreation at Lake Fundudzi: Local young men preparing fire for a fish braai

No fishing boats or any other craft were observed in Lake Fundudzi during the two days of field research. Respondents explained that absence of boats is due to beliefs that the lake is "a place of things", and somewhere in the middle of the lake there is a place where those who go do not come back. All villagers in the area know that the middle of the lake is a "no-go area". It was said that during some drought years in the past, when the lake had little water,

some white people wanted to build a small camping house on the dry lake bed. They started construction work on the first day and left some poles lying around, which they intended to use in finishing up the building on the next day. When they came the following day, they found that water covered the whole lake bed and the little house was completely submerged. Furthermore, the lake had gone back to its normal size overnight without any rainfall to increase the water level. To date, the site of the submerged camping house marks the no-go area of the lake, which is called "*Madandalani*" (meaning 'place where there are poles'). Respondents explained that strange things always happened around that place. By observing changes around *Madandalani*, villagers could also tell when severe droughts were imminent. Local people had also observed that whenever water levels decreased and some parts of the lake became dry, the no-go *Madandalani* area would remain an exception (i.e. it never becomes dry). A local colloquial term for this particular portion of Lake Fundudzi is "pool of the Netshiavhas" ("*dzivha la vho-Nesthiavha*"). All local people are too scared of going there.

The fishers were concerned that the water might have some form of acid, which destroys any plant that comes in contact with the water. For example, vegetation that gets covered by water when the lake water level is high tends to become dry and die out when the water level drops and leaves vegetal growth exposed on the banks. However, vegetation that dries from exposure to lake water was said to be very good for making fire since it catches fire quickly, "as if it has paraffin", and burns for longer.

Some of the fishers said that if a tin happened to fall into the lake water, after a few days or a week, it would be found lying outside the lake and would not look like a can anymore because it would be "rotten" (i.e. corroded). Local people believe this is one of the ways that the lake cleans itself.

9.6.1 Example of a Subsistence/Recreational Fisher

A subsistence fisher was one of the people who were found fishing in Lake Fundudzi (Figure 35). He is bread winner to a household of fifteen (15) people, where none is employed other than himself. He earns income from welding and goes fishing once or twice a week mostly on weekends. He catches fish to eat because fish forms an important part of his household's diet. He also considers fishing as a great form of entertainment and reduction of stress. He started fishing at an early age before he started school. His children all fish, including the younger girls. During the field survey, he was fishing with his eight (8) year old son, who also had his own rod. The respondent said he does not have a fishing license. The respondent stated that a really good catch is one in which a fisher can fill a 10kg bag. Using his fishing rods, he is often able to do so because most fish come to the banks to look for food. He can always tell if it was going to be a sunny or rainy day, from changes in the colour of water, such as when water in the lake turned "red".

Figure 35 Lake Fundudzi: Recreational/subsistence fishing

Indigenous Knowledge Systems and Practices Around Lake Fundudzi: Respondent X

Towards clarifying some the above findings on indigenous knowledge systems and practices, researchers interviewed a local key resource person, who was a young man aged between 25 and 30 years. The respondent wanted his identity to be kept anonymous. Hence this report uses the pseudonym 'Respondent X' to refer to him. Respondent X said that the Netshiavha Royal Family, which includes married women who are no longer staying with the family, have their own special burial site next to the chief's house. He said there are special times where members of the family gather to perform some rituals. Before they perform their rituals, they consult with their ancestral spirits to find out whose bones must be exhumed for burning (i.e. cremation). Whoever the spirits reveals to the chief, they exhume and burn the bones. The ash is then spread in the lake as part of the royal ritual.

It was also said that according to their custom, whenever a Netshiavha family member passes away, they are buried in the backyard of the palace. This burial process cannot be carried out if the appointed or acting chief is not present. According to Respondent X, the current chief can be "stubborn" (i.e. difficult) at times. When he knows that one of the married female family members has passed away and knows that relatives will be coming to bury her on a certain date and time, he might decide to go on an unplanned trip and just disappear without anyone knowing his whereabouts. Unknowingly, the extended family will bring the corpse and find that they cannot enter the yard or graveyard before he comes back (without his presence). That way, the chief demonstrates his power. Respondent X also explained that the chief is always rewarded with meat each time a family member passes away. Hence, extended family members have to make sure they bring meat to him. Normally, they bring the hind limbs of a cow or goat and it should be properly cut in a certain expected way, otherwise the meat is given back to the family who brought it and they should bring more meat that has been properly cut according to custom.

Indigenous Knowledge Systems and Practices Around Lake Fundudzi: Secondary Sources

In cross-referencing statements made by Respondent X researchers referred to a published video that can be viewed on National Digital Repository website[41]. The video relates to indigenous knowledge and stories about Lake Fundudzi as told by a young man named Mashonelo from Tshiavha, who is part of the Netshiavha Royal Family.

In the video, Mashonelo emphasizes the fact that Lake Fundudzi belongs to the Netshiavha ancestors. He confirms Respondent X's statement that members of the Netshiavha family usually go to the lake to celebrate with their ancestors and to do a ceremony called *Thevhula*. *Thevhula* refers to an indigenous ritualistic practice whereby when Netshiavhas die, they are initially buried in Tshiendeulu (a royal family graveyard) and after a while their bones are exhumed, burnt and the ash poured into Lake Fundudzi at a certain part of the lake. This ritual is done to enable the deceased to join other family members in the spiritual realm. Every member of the family who dies ends up joining the others. The ritual is therefore a way of gathering all members of the Netshiavha bloodline together and establishing themselves as a family inside Lake Fundudzi.

Mashonelo further says that he spends most of his time at the lake, since he is a grandchild to the Netshiavha ancestors. Every time he arrives at the lake, he first introduces himself so the ancestral spirits may know who he is and where he is from. He does this so that nothing strange happens to him. If he fails to introduce himself, the lake might become "angry" and things will not work out for him anymore (Quote: "*If I don't introduce myself the ancestors will be upset and bad things might happen to us*"). He alluded to are different ways of introducing oneself but they all serve one purpose. "The first one is to pour the snuff on the ground whilst talking to our ancestors because we know the way we introduce ourselves differs from generations. As for me, I come close to the lake, turn my back to the lake and bend down to look at the lake upside down through spread legs." As a true Venda man, he says he feels very proud of Lake Fundudzi as it clearly defines who he is. He loves the lake because he goes there with problems in life to tell his ancestors and after that his problems disappear.

The secondary data source (i.e. video on Lake Fundudzi indigenous knowledge) therefore confirms views expressed by respondents to this study's primary research, particularly with regard to indigenous knowledge systems (IKS) and practices. Although the video does not give specific attention to fishing, findings are that fishing activities are closely intertwined with IKS and practices. The latter, as well as prevailing traditional institutions, will therefore play a significant role in determining the structure of any future interventions relating to the management and governance of Lake Fundudzi fishery.

9.7 Discussion and Conclusion

Lake Fundudzi provides an essential resource of water for various purposes as well as food in the form of fish. The lake is used by locals for subsistence and recreational purposes. Given the widely-held local beliefs that Chief Netshiavha and the Netshiavha Royal Family have all the power and custodianship over the lake, these key primary stakeholders as well as ordinary members of surrounding rural communities and indeed

[41] ***http://ndr.org.za/indigenous-knowledge/stories/142/videos***

the whole traditional institutional set-up around Lake Fundudzi, all need to be considered in processes to formulate new institutional arrangements for inland fisheries. The interview with Chief Netshiavha (Section 5.8.2) reveals an advanced environmental consciousness and sense of heritage and responsibility. The fact that such traditions and governance arrangements are respected by local people around Lake Fundudzi as well as many outsiders seems to attest to these institutions' widely perceived legitimacy.

From the views expressed by respondents, the chief's council should monitor the dam and ensure nature conservation. Government should help in protecting the area because the burden is (according to Chief Netshiavha) "too heavy for one man to carry", meaning the chief will not be able to do it alone without the help of authorities at higher levels. Those local people, who are have passionate interest and love for nature, could contribute to keeping the lake free from unauthorized fishers who over-fish and from indigenous tree 'raiders'. Since one person cannot be a ruler, a ranger and a judge at the same time, there should be a shift of powers to include other skilled people. However, it is only through proper research and understanding of what constitutes acceptable power sharing that change can be brought to the fore. Respondents expressed the view that change is always painful to those who have stayed in power for a long time. This seems to indicate the need for a carefully managed consultative process regarding discussions on possible institutional arrangements for the governance and management of Lake Fundudzi.

References and Bibliography

Department of Water Affairs (DWA), Water Services National Information System- (WS NIS) a Limpopo community report available at

http://www.dwa.gov.za/dir_ws/wsnis/default.asp?nStn=pg_reports&FilterSelection=true&AlphaChar=&Prov=9&DMCode=DC34&LMCode=NP343&curReportID=205&cid=3&cursecAuthorityCode=&curLinkID=&curYear=10&SearchStr=&curLevelID=3 accessed on 25 April 2011

Khorommbi, M. 2000. *Towards a Sustainable Land- Use Plan for the Lake Fundudzi Catchment Area.* Unpublished Masters Dissertation, University of Pretoria, Department of Zoology and Entomology.

National Digital Repository › Indigenous Knowledge › Stories › Lake Fundudzi › Videos presented by Mashonelo from Tshiavha available from ***http://ndr.org.za/indigenous-knowledge/stories/142/photos/715***.

Van Der Waal, B. C. W. 2000. *Fish as a resource in a rural river catchment in the Northern Province, South Africa.* Department of Biological Sciences, University of Venda for Science and Technology

10 ZEEKOEVLEI, CAPE TOWN, WESTERN CAPE

10.1 Introduction

Figure 36 Recreational fishers being surveyed on Zeekoeivlei

In August 2010 prior to research, the principal researcher (Barbara Tapela) initiated a multi-stakeholder consultative process to select a case study for the Western Cape Province. The process resulted in a consensus among stakeholders that Lake Zeekoevlei would be a suitable choice. The selection of the lake might seem to vary from the emphasis on rural inland fisheries by the WRC 1957 project title. However, the rationale informing this choice was that since most of the cases selected for more detailed study would be rural, inclusion of an urban-based fishery would provide useful contrasts and insights for policy. As such, selection in this case was guided by criteria such as 'locality' of the inland fishery (i.e. local significance of fishery irrespective of rural or urban location), evidence of active use of fishery and existence of specific property rights jurisdictions (Nature Reserve land) and multiple organisations (e.g. Cape Nature and City of Cape Town) and primary stakeholders (e.g. subsistence and 'other' fishers, recreational angling, yachting and bird watching clubs, and local communities). This case should therefore be seen in light of the contrasts it provides to the largely rural fisheries examined by the study. The case of Lake Zeekoevlei also provides useful contrasts with regard to access issues relating property rights and servitudes applying to land around the fishery.

Two stakeholder consultation meetings were held in March 2011 and a field survey conducted over two days in April 2011. The first meeting was held on 10 March at Rondevlei in Cape Town and involved representatives of Cape Nature, City of Cape Town (Biodiversity Management Section), the provincial Department of the Agriculture and Elsenburg. The second meeting was held on 16 March at Westlake in Cape Town and involved a representative of City of Cape Town's Catchment Management Section. Other identified stakeholders, such as WESSA and CSIR were also invited but could not attend. In these meetings, ACWR was represented by Mrs Barbara Tapela and student researcher, Ms Rozwivhona Magoba.

Ms Magoba conducted field surveys at Zeekoevlei Lake in Pelican Park on Saturday 7th and Sunday 9th of April. The purpose of the surveys was to characterize and capture views of fishers on their current fishing practices in Lake Zeekoevlei.

10.2 Methodology

Two principal approaches to data collection were used namely, Stakeholder Consultation and Field Surveys. The former methodology enabled the research process to take into account and capture the inputs, views and concerns of institutional (i.e. secondary) and organized primary stakeholders. This approach deliberately avoided embarking on wider consultations with unorganized stakeholders at such early stages of research. Given the high levels of poverty and unemployment, on the one hand, and the potentially lucrative exploitation of inland fisheries (in general), on the other hand, the research strategy was part of due diligence in ensuring that research does not inadvertently and prematurely create expectations and demands for access to fishery resources.

Field Surveys were conducted in order to obtain useful qualitative and quantitative insights through rapid appraisals of fishers in Zeekoevlei Lake. Surveys were undertaken over two days, one a weekday and the other a weekend day. This was done in order to capture the views of a range of fishers, who fish during weekdays and/or weekend days). The researcher took 'walks' along the lake shore and conducted 'spot' interviews with fishers that she came across. Prior to the surveys, preparation for entry into the fishery was made during

the stakeholder meeting that was held on 16 March with a senior official representing City of Cape Town's Catchment Management Section. The researcher was advised to speak to a senior staff member at the Rondevlei Nature Reserve office, who then directed the researcher to the Zeekoeivlei manager (Josh). After explaining to this manager the aim and objectives of the research, he gladly agreed to provide assistance and support and to personally take the researcher to the site, where he also helped with data collection.

A challenge that was faced during research was that fewer organizational representatives than expected attended the first stakeholder consultation meeting. Others had confirmed their attendance but sent last minute apologies. Some of the key stakeholders then had to be met on one to one sessions that were organized on a later stage. A second challenge related to the (female) student researcher's personal safety concerns while conducting field surveys. Parts of Zeekoevlei Lake are located in areas that are remote from residential areas, and tall reeds grow in thick stands around the lake. Given past reports about criminal attacks within the vicinity of the lake, this threat had to be addressed prior to research. The researcher had to be accompanied by the Zeekoevlei Reserve manager and other people during the course of field surveys.

10.3 Background to the Study Area

10.3.1 Location

Lake Zeekovlei is sited on the Cape Flats. It is one of the largest lakes in the Western Cape Province. It is located adjacent to Rondevlei Nature Reserve (and Bird Sanctuary) and close to the M5 highway (Prince George Drive). The lake is surrounded by formal residential areas, such as Pelican Park, Grassy Park and Retreat. Some informal urban settlements are also situated not far from the lake. There are private homes on the banks just a few meters away from the lake and more than twenty-three (23) different clubs use the vlei for water sports like sailing, rowing, water skiing and fishing.

The wetland area around the lake is 700 hectares in extent. The lake is basically an artificially dammed wetland the naturally occurring water body and is soon going to be fenced off as part of the False Bay Ecology Park, this is being done for better management in controlling access, fishing activities and security reasons as there are some of the alien important fish species and a few hippopotamus population.

10.3.2 Socioeconomic Profile

Communities that live around Zeekoevlei have mixed socio-economic profiles. The majority of people living around the lake are 'coloured', while 'white' and 'black' populations are smaller. Qualitatively, income groups range from high, middle to low. Although formal settlement areas accommodate all three groups, informal settlements also house many people within the low income group. The higher income groups live close to the wetland margins and farther away from the lake (i.e. body of water), while lower income people of different racial groups live close to the lake. Many people from the informal settlements come to fish in order to feed their families (i.e. for subsistence), through consumption and/or sale of fish caught. Many others from nearby formal residential areas and elsewhere come to Zeekoevlei for recreational angling and similar leisure activities. According to a 1991 study by International Lake Environment Committee (ILEC) (1991), land within Zeekoevlei catchment is allocated for various uses, principal of which are Residential (33%), Agricultural (26%) and Open Space (30%). However, since the study was done ten (10) years ago, there have been land use changes, such as the encroachment of informal settlements within parts of the catchment.

10.4 History and Management of the Inland Fishery

According to stakeholders consulted at a meeting held on 10 March 2011, Zeekovlei is a lake that was formed when a large wetland fed by Lotus River and Little Lotus River was artificially dammed (Figure 37). Zeekoevlei is part of a proclaimed nature reserve under management and ownership of the City of Cape Town. The land around the lake is state property, which is unfenced and surrounded by private residential land. The entire Zeekoevlei area is controlled by the city of Cape Town and will be soon fenced off, thus making it part of the envisaged 'False Bay Ecological Park'[42].

[42] Stakeholder consultation meetings of 10 and 16 March 2011.

In the 1950s the southern portion of land within Zeekovlei and Rondevlei was reclaimed and a sewage works constructed, which served as a Waste Water Treatment Plant for Simons Town. This development led to the permanent separation of Rondevlei and Zeekoevlei from the sea and from each other, as they had been one large wetland before then. Prior to this, marine fish species used to easily migrate into the wetland and some of them could survive in this freshwater ecosystem. Later on, after the separation of the two wetlands from each other, a fish ladder was built between both Rondevlei and Zeekovlei and the sea to enable marine fish to move upstream into the lakes. However, due to the strong downstream current, such ladders have not been sufficiently effective. Furthermore, the more aggressive and invasive alien freshwater fish species have colonized Lake Zeekoevlei (and Rondevlei) and populations of marine and indigenous freshwater species have declined significantly.

Figure 37 Lake Zeekoevlei: Location[43]

[43] Source: International Lake Environment Committee (1991)

The lake undergoes a process of 'drawdown' every year (annual drawdown) as a cleaning mechanism. The drawdowns are done to reduce the nitrates and other nutrients that accumulate in the lake. All the runoff from Khayelitsha and Phillipi townships runs into the lake and this causes rises in nutrients levels leading to algal blooms due to the high level of blue and green algae and sludge. Organic pollutants increase Biological Oxygen Demand (BOD), leading to depletion of dissolved oxygen in the water and the death of aquatic micro-organisms, such as algae. If the algae die inside the water it poisons the water and, in turn, fish also die. This explains why brackish Zeekoevlei water needs to be diluted and flushed out regularly and sediments and sludge cleaned out of the system from time to time. A lot of fish (close to 80% of the fish population) are lost during such times. Such lake maintenance processes, however, cannot be stopped because they are critical to Zeekoevlei ecosystem management. For the year 2011, the drawdown was scheduled to start on 27 April and gradually continue until early in June, since the water flows out slowly. Adoption of such clean-up processes has contributed to gradual improvements of Zeekoevlei water quality.

According to key resource persons from key stakeholder organisations, fishing has been practised in Zeekoevlei for many years. There are no discriminatory rules of access and all interested persons are allowed to fish in the lake, regardless of where they come from (place of origin), gender, age, race or any other attribute. Section 53 of the Nature Conservation Ordinance, 1974 (Ordinance No. 19 of 1974) states that any person engaged in catching fish must be in possession of either a freshwater fishing licence. Drawing from this ordinance, Section 12 of City of Cape Town's 'By-Law Relating to the Use and Control of Recreational Water Areas and Boating, 2010 provides regulations on the catching of fish in recreational freshwater bodies, such as Lake Zeekoevlei. Although these regulatory frameworks apply to Zeekoevlei fishery, there do not seem to be any strong management arrangements for the fishery, such as 'bag limits' and monitoring and enforcement of permit requirements.

Section 12 of the City of Cape Town 'By-Law Relating to the Use and Control of Recreational Water Areas and Boating, 2010' states that each person is allowed a maximum of either two fishing rods with only two hooks per rod or two long lines. Fishing by use of nets is not allowed. No bag limits are set as yet and selling of fish on site is prohibited. However, a person can catch the fish, drive away and then sell it along roadsides and small markets. Although there seems to be no significantly visible practice of selling fish, it is not clear to what extent fishers sell fish within informal settlements. There is a need therefore for further research to develop clearer understandings on the extent and characteristics of informal marketing of fish caught in urban fisheries, such as Zeekoevlei.

The City of Cape Town employs two (2) workers to look after Zeekoevlei. However, these workers are by themselves too few to effectively manage and keep control of this large and unfenced fishery that is surrounded by nature reserve land, open spaces, private residential land and informal settlements. By contrast, Rondevlei presents less of a challenge although it is similarly located within a nature reserve. Rondevlei has controlled access, is managed by many workers, clearly regulates catch limits, charges a R30 daily entrance fee and restricts the use of motorized boats. Rondevlei also has only one entrance gate and the total number of people who come in is monitored. Visitors are required to give reasons why they are going in, since fishing happens to be one among several major activities around Rondevlei. The lack of such institutional arrangements in Zeekoevlei raises questions about the requisite governance and management regimes for the sustainable development of the fishery, if such is possible, given the presently high levels of pollution and contamination. It has yet to be seen whether or not the proclamation of False Bay Ecological Park will lead to any modifications to existing institutional arrangements, or lack thereof, in Lake Zeekoevlei.

10.5 Characterization of Indigenous Knowledge and Current Fishing Practices and Techniques

10.5.1 Findings from Key Stakeholder Organisations

In a motivation for this study's selection of Lake Zeekoeivlei, Dr Stephen Lamberth of the national Department of Agriculture Forestry and Fisheries (DAFF)[44] stated that although the fishery almost exclusively consists of alien species, such as carp, Mozambique tilapia and sharptooth catfish, there has been an interesting

[44] E-mail discussion among consulted key stakeholders, 03 August 2010.

change in the dynamics over the last ten years or so. Prior to the last decade, most of the fishing was recreational, with limited sale of carp and Mozambique tilapia at the side of the road. The end-productwas usually pickled or curried fish. Aside from this, there was little consumption of freshwater fish in the Western Cape (or the rest of South Africa for that matter). Since then, the influx of immigrants from sub-Saharan countries to the north has been accompanied by a culture of eating freshwater fish and the development of a market to accommodate them. There are those who now supplement their income by supplying that market. Cultural interaction has also seen a taste for freshwater fish develop amongst the locally born population. In addition to this, South Africa is being promoted as a relatively cheap tourist destination for recreational anglers to come and catch carp and similar species. The downside to all this is that water quality in Zeekoevlei and similar urban-based systems may be detrimental to the health of the fish and those who consume them. Findings from key organisations consulted during research largely confirm many of Lambert's statements.

Findings from meetings and interviews with institutional representatives were that two broad types of fishers use Lake Zeekoevlei namely, recreational anglers and subsistence fishers. Recreational anglers fish for pleasure or for competition. Subsistence fishers fish primarily for survival and/or to diversify their livelihood strategies and thereby supplement household food supplies or income, although they might also fish for recreational purposes.

Institutional representatives identified two types of recreational anglers in Zeekoevlei. These are:

- Casual recreational anglers, who are not necessarily members of any organized angling club, carry out fishing activities in varying frequency and practice catch-and-release fishing techniques; and
- Formal recreational fishers, who are mostly members of national, provincial and/or local fishing clubs that periodically hold competitions in the lake.

With regard to the latter, Zeekoevlei has a record of 120 anglers who caught nine tons of fish in a competition conducted over three days. This was done as a sport.

Some institutional representatives perceived subsistence fishers to be people who fish for survival and catch the fish to only feed themselves and their families. Other representatives acknowledged that some of the 'subsistence' fishers sold their catch in informal markets, such as along roadsides. Quite often, subsistence fishing was said to be done on a small-scale and mainly by fishers who live relatively close to Zeekoevlei but also, to a lesser extent, by people who come from more distant residential areas, such as Mitchells Plain and Retreat. About twenty (20) to thirty (30) subsistence fishers were said to visit Zeekoevlei per day. Fishers used fishing ropes and long lines, and use of nets was prohibited.

The foregoing findings were cross-referenced with views and records by officials directly involved in the day-to-day operational management of Zeekoevlei. Records show that, on average, approximately six thousand (6000) people enter through the Zeekoevlei gate per month (Table 4). Reasons for visits to Zeekoevlei include fishing, bird watching, employment, braai picnics, aircraft flight shows and yachting. A number of clubs, including recreational angling clubs, are involved in some of these activities.

Table 4 and Figure 38 shows that, throughout the year 2010, significantly more people visited Lake Zeekoevlei for purposes of fishing than for bird watching. Fishing attained the highest peaks from August (3932 visitors) to October (7745 visitors). From the graph, it can therefore be deduced that the fishing season is mainly from late winter and to spring. The sharp increase in the number of fishers, which is noticeable from August to October, is followed by a sudden decrease in November. An average of between one thousand (1000) and one thousand five hundred (1500) people visited Zeekoevlei for fishing purposes per month.

According to the reserve gatekeeper, such visitors were mainly recreational anglers and subsistence fishers. In the gatekeeper's view, an average of about fifteen (15) subsistence fishers were said to visit Zeekoevlei every day. Visits by recreational anglers were said to rise significantly during angling tournaments. Angling was the most popular fishing method, with fishers using lines and rods but no motorized boats. Although fishing was limited to two rods and two hooks per person, fishing activities were largely unmonitored.

Table 4 Numbers of people who visited Zeekoevlei in 2010[45]

Months (2010)	Bird Watching	Fishing	Braai Picnic
January	263	1359	4377
February	225	1062	4421
March	373	1290	5103
April	598	1223	4645
May	172	854	3379
June	130	739	2995
July	214	1299	3877
August	233	3932	2401
September	303	4263	2637
October	294	7745	4719
November	312	523	2420
December	272	876	4728
2011			
January	185	767	2314
February	138	441	1153
March			

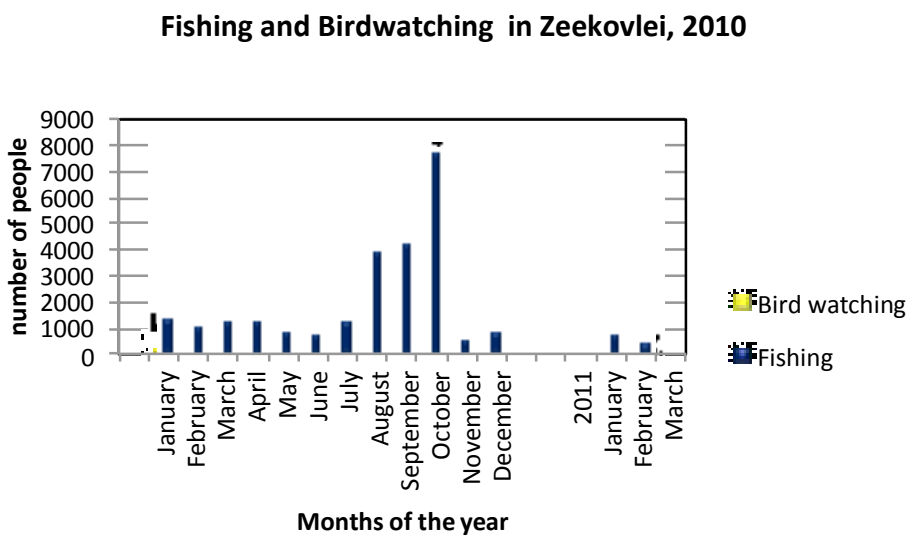

Figure 38 Lake Zeekoevlei: number of visitors participating in fishing and birdwatching activity

In a stakeholder consultation meeting with representatives of Cape Nature, the Western Cape Department of Agriculture and City of Cape Town's Biodiversity Section, concerns were strongly voiced about the possible dangers of human consumption of freshwater fish caught in urban fisheries, such as Zeekoevlei, which had heavy metal content. Run-off from roads and other urban surfaces causes heavy metal pollution of freshwater bodies, with the possibility that fish become contaminated with heavy metals. Participants considered that although no detailed studies had been carried out on inland fisheries within the Cape Metropolitan Council Area, heavy metal poisoning was possibly a real threat, particularly to those who consumed such fish regularly and in large quantities. A suggestion was made that evidence-based guidelines on safe levels and patterns of fish consumption would be helpful. Such guidelines would be communicated to fishers, anglers and the public in general.

[45] Data obtained from both the reserve manager and the gateman of Zeekoevlei, April 2011.

A related concern was the sale along roadsides of fish caught in Zeekoevlei and similar urban fisheries (dams, lakes and rivers). It was stated that although City of Cape Town's By-Law Relating to the Use and Control of Recreational Water Areas and Boating (2010) states that the catching of fish may only be practiced as a sport and no fish caught in the recreational water area may be sold, such fish were sold in informal markets. While the sale of fish (in general) on roadsides was a widely accepted cultural practice in the Western Cape, a problem was that it was often not possible to determine the sources and therefore fitness of such fish for human consumption.

A representative of City of Cape Town's Catchment Management Section raised concerns about the degradation of the estuarine ecosystem around the whole of the False Bay area, including Zeekoevlei and similar wetlands and lakes. The official envisaged that, in the near future, the estuarine would be restored back to allow introduction to the wetland of as many indigenous fish species as possible and to reduce and control populations of existing alien fish species. The official responsible for managing Zeekoevlei expressed a concern about the over-harvesting of fish that has been increasing over the past few years. Numbers of subsistence fishers had been increasing over time and without controlled catch limits in Zeekoevlei, unmanaged harvesting could result in the total extinction of some species, particularly indigenous fish species. A senior official representing Cape Nature considered that the anticipated future increase in subsistence fishing in Zeekoevlei will require adoption of effective and acceptable institutional mechanisms for sustainable management of the fishery. Stronger security measures also needed to be taken into consideration.

10.5.2 Findings from Rapid Appraisals of Fishers

This section presents findings from field surveys conducted along Zeekoevlei Lake shores over the course of two days, one a week day and the other a weekend day. Where respondents opted to remain anonymous, code names are used.

Subsistence Fisher from Mitchells Plain

A male fisher, who was aged between twenty (20) and (30) years was interviewed. He lives in Mitchells Plain in a household of seventeen (17), of whom six (6) adults are formally employed by government, four (4) are unemployed and all seven (7) children go to school. He was unemployed and was neither the breadwinner nor head of household. Although he did not confirm it, his accent seemed to indicate that he was originally from outside South Africa. He fished only on weekdays since on weekends it is too full and people fight for the best fishing spots, with their lines crossing each other. He catches fish to eat at home with his family. He went fishing four (4) days per week, mostly from eight o'clock in the morning (0800 hours) to half past three in the afternoon (1530 hours). On the day of the interview, he had begun fishing at 0800 hours and at 1130 hours he already had five fish, which measured between 30 and 40 cm in length. He caught the sixth fish within 15 minutes into the interview (Figure 39).

He used long lines with two hooks on each line. He also used home-made bait consisting of 'Impala' mealie meal mixed with essence to lure the fish. He does not take fish that is less than 2kg in weight and throws back any smaller fish than that. On a good day, he took home at least five (5) to six (6) large fish. His household eats fish about three (3) times a week. If the catch is large, they keep the surplus in the freezer for later consumption. Sometimes he gives surplus fish to his friends.

Figure 39 Zeekoevlei: Subsistence fisher Bodei collecting his sixth fish of the day

He described cold and windy weather as not very good for him. His perfect fishing weather is sunny and moderately windy ("less than 30 degrees and 30 knots"). He felt safe when fishing alone in Zeekoevlei and is only concerned about those people who came

Figure 40 Zeekoevlei: Licensed recreational angler

fishing using nets despite it being illegal in Zeekoevlei. He feels that corrective measures have to be taken into account in dealing with such non-compliant behaviour.

Subsistence/Recreational Fisher from Retreat: Respondent 'Y'

The second interviewee, Respondent Y, was also a subsistence fisher (Figure 40). He was the bread winner to his family. He and his wife were both formally employed and stayed with their four (4) children in Retreat. Respondent Y was aged between 40 and 50 years. He came to fish in Zeekoevlei only when he was free, which was usually twice per week. He said that he was currently teaching his thirteen (13) year old son to fish since the schools were closed for the holidays. Among all fishers and anglers interviewed during field surveys at Zeekoevlei, Respondent Y was the only respondent who possessed a fishing licence.

Respondent Y began fishing in Zeekoevlei in 2009 and said the average number of fishers has decreased since then, but the catch rate was still the same. He used rods, reels and hooks, with a home-made flavoured mixture of mealie meal, corn and crushed bread to lure the fish. He also only took home fish that weighed at least 2kg. If the fish weighed less, he threw it back into the water. He released the smaller fish because such fish are generally known to have a lot of bones and are too small to handle (i.e. clean and prepare for cooking), which made it easy to choke if one was not careful in eating it. Since he started fishing, he had only noticed two kinds of fish from Zeekoevlei. These are Mozambique tilapia, which is an alien species, and carp. He dis not take tilapia because he does not like it. It is too small in size and contains a lot of small bones, which are hard to see when you eat.

Figure 41 Zeekoevlei: family on a weekend fishing picnic

He said the chances of getting a good catch are always high from May to June, when lake water levels are low (i.e. during the annual drawdown period). Respondent Y confirmed an earlier sentiment that strong winds and cloudy weather was not good for making a good catch.

Respondent Y felt safe when fishing and liked it when the lake area was quiet and he could listen to the sweet harmony of nature, such as the sounds of wind blowing, water flowing and birds singing. That was the best thing he liked about fishing in Zeekoevlei. "I go fishing when I want to stay alone in the quiet". He surmised that fishing is a great sport to him, and he loved and enjoyed it. However, he also enjoyed eating fish and prefered it fried with spices[46].

Informal Recreational Angler Family from Franschoek

The family of six lived in Franschoek (Figure 41). At the time of the field survey, the family were visiting their parents in Retreat (Cape Town) for the weekend. They were spending the day having a fishing picnic, and were keen to share with the researcher information about their fishing practices.

The family has been fishing for four (4) to five (5) years (i.e. since 2006 or 2007), not only in Zeekoevlei but also in other dams, such as Robertson Dam and Berg River Dam. Members of the family said that fish in

[46] Respondent Y told the researcher that he had come fishing on the previous day and on the day of the interview had brought a fried piece of fish "from yesterday's catch" as lunch for him and his son.

Zeekoevlei are larger and greater in number than those in the Berg Dam, whose water is more yellow. They use fishing rods and hooks. They lure the fish using ground bait, which is a home-made mixture of mealie meal, bread, coconut and vanilla essence, together with colorants (Figure 42).

Figure 42 Zeekoevlei: Home-made ground bait used by most fishers and anglers

The family went fishing at least three (3) times per month and everyone in the family enjoyed the fishing picnics. The mother, who is aged 34 years, said that she loved staying by the water side. She also emphasized that freshwater fishing is a "patient" sport, meaning that sometimes anglers can go out fishing for a whole day and only come back with one (1) or two (2) fish. On the day of the interview, they happened to have been lucky and had caught one (1) fish within the first two (2) hours (Figure 43).

Figure 43 Zeekoevlei: Recreational fisher Hendricks showing off his first fish of the day

They take home only a few fish and give away the rest of their catch to people who may happen to be walking by the lakeside. They seldom eat fish at home. When they give fish away to people, some end up fighting over the fish because they all want the bigger ones. For the family, summer is the best fishing season. It is difficult to fish in winter because of the rain and strong winds that blow in Cape Town. They consider the area around Lake Zeekoevlei to be not safe at all because "people" (i.e. criminals) take chances at times. Their greatest concern is about the lack of security around the lake, and they would like to see an increase in security patrols around the lake to make them feel safer.

Group of Informal Recreational Anglers From Mitchells Plain

A group of four (4) friends were found fishing further down the lakeshore (Figure 44). During the interview, they gladly shared their views. They said that they all lived in Mitchells Plain. They loved fishing and came to Zeekoevlei between eight (8) and ten (10) days per month. They normally came at 0800 in the morning and fished until 1630 in the afternoon. The group only used rods and sometimes hand lines. They regarded fishing activity as their "play time", "a time for fun" and a means of "running away from home because there is too much stress". If they caught a lot of fish, they took the ones they would eat at home and threw rest of the catch back into the water. They all feltsafe in Zeekoevlei, although in the past it was not safe.

Figure 41 Zeekoevlei: Group of 4 friends who practise informal recreational angling together

The researcher held a more detailed interview with one of the four anglers, who is herein referred to as Respondent Z. He lived in Mitchells Plain and is a regular fisher in Lake Zeekoevlei. He fished on two (2) days per week and only stayed for a maximum of four (4) hours each day. He fished by the lakeside using rods, hooks and bait. Respondent Z shares his catch with his neighbours and friends. If the catch was large, they sometimes made a braai. He takes all sizes of fish. The small fish were good for mince and while the larger fish tasted best when smoked. Respondent Z said he did not feel safe when alone at

the lake because there are many records of crime committed around the lakeshore. He also said that two (2) weeks before, an unknown man broke into his friend's car while they were fishing just a few meters away. Respondent Z was also personally concerned about the cleanliness of the place and suggested that people should be charged a levy or fee at the entrance. With this money, responsible authorities could hire cleaners who would keep the place tidy.

Subsistence Fisher: Respondent 'Q'

The sixth respondent interviewed during field surveys was a 42 year old male subsistence fisher, Respondent Q, who is a regular in Zeekoevlei. He fished during weekends and ate more fish than meat. He took home a few fish and gave the rest of his catch to poor people. Like most of the other respondents, he did not feel safe fishing alone in the lake. He was once nearly stabbed by an unknown man while he was fishing alone early the year before(i.e. 2010). Respondent Q would like to see the weeds on the banks removed to enable greater visibility over longer distances.

10.6 Discussion and Conclusion

Many people from within and outside Cape Town use Zeekoevlei fishery for subsistence and for formal and informal recreational purposes. Zeekoevlei also provides an essential source of food, particularly to the less affluent people living in residential areas around the lake. Owing to time constraints imposed by the baseline and scoping study, field surveys were not able to rigorously determine the geographical 'range' of the fish caught in the fishery, the fishing effort, catch sizes and compositions and the proportions of fish consumed, sold, donated and preserved. While collection of such information will require further in-depth research, findings of this survey show that, on a day-to-day basis, most of the fishers found in Zeekoevlei are subsistence fishers and bread winners to their households. Fish contributes a large proportion of their protein intake, since it is eaten more often than other meat.

Most of the fishers and informal recreational anglers in Zeekoevlei use home-made ground bait to lure the fish. They believe that adding vanilla, pineapple and/or strawberry essence to mealie meal attracts fish faster, since the fish can smell essence from about 100m away. The fishers and informal anglers therefore use such bait as a strategy to decrease fishing effort, in terms of time spent relative to catch size. There are currently no bag limits applying to Zeekoevlei, and no support and monitoring of informal fishing and angling activities. While Cape Nature has taken the decision that invasive fish species should not be released back into fisheries, many of the respondents reported that they tend to release fish they do not prefer to take home, which could be small fish, particular fish species or surplus catch. There seems to be a need to provide information and technical support to informal fishers regarding requisite practices and techniques.

Most of the fishers and anglers interviewed did not feel safe. This was because the area around the lake was not 'open space', but was overgrown with reeds, far from residential areas and therefore "dodgy". Towards addressing concerns about possible crime, fishers and anglers would like to see a security team patrolling the place much of the time. They would also like to see the removal of reeds along the lakeshore in order to open up more space for fishers to stand when they throw their liners. This will reduce competition for the few good fishing spots. This will also increase visibility, thus enabling fishers to spot from a distance anyone approaching from all sides.

A key concern expressed by representatives of key stakeholder organisations namely, Cape Nature, the Western Cape Department of Agriculture and City of Cape Town's Biodiversity Section, related to the possible dangers of human consumption of freshwater fish caught in urban fisheries, such as Zeekoevlei,which had heavy metal content. According to respondents, although no detailed studies have beencarried out on inland fisheries within the Cape Metropolitan Council Area, there was a need to addressthe real possibility of heavy metal poisoning, particularly for people who consumed such fish regularly and in large quantities. It was suggested that it would be useful if evidence-based guidelines on safelevels and patterns of fish consumption could be developed and communicated to fishers, anglers and the public in general.

Concerns were also raised about littering of the lakeside. Respondents expressed views that Zeekoevlei management should put more effort into cleaning the place up and providing dumping bins, since people are currently leaving their rubbish lying around. Suggestions also included an entrance fee to be charged, which would cover the costs of hiring cleaners to look after the lakeside area.

10.7 References and Bibliography

City of Cape Town. 2005. False Bay Ecology Park: Information Brochure. Internet [***www.fbep.co.za***]

City of Cape Town. 2010. By-Law Relating to the Use and Control of Recreational Water Areas and Boating. Published by the City of Cape Town.

City of Cape Town. 2010. '*The city is proclaiming 17 sites in Cape Town as Contract Nature Reserves'*. Interactive media brief issued by the Communication Department on behalf of the Environmental Resource Management Department, City of Cape Town. Internet [***http://thegreenery.southerncrossroads.info***] 10/03/2011

Department of water Affairs_ South Africa, Water Services National Information System – (WS NIS) online, retrieved from: ***http://www.dwa.gov.za/dir_ws/wsnis/*** on the 26 April 2011.

International Lake Environment Committee (ILEC). 1991. Study on Promoting Sustainable Management of the World's Lakes and Reservoirs. Internet [***www.ilec.org.jp***] 3/8/2010.

11 DRIEKOPPIES DAM, MPUMALANGA PROVINCE

Figure 45 Driekoppies Dam wall

11.1 Introduction

This section of the report outlines background information and findings made from fieldwork undertaken in and around Driekoppies Dam in Mpumalanga Province. Fieldwork was done on the 1st of April 2011. The research was undertaken by prospective PhD student Ms Vimbai Jenjezwa.

11.2 Methodology

To undertake the fieldwork around Driekoppies Dam, the researcher obtained access to the fishery and local communities through the assistance of employees of the Komati Basin Water Authority (KOBWA). The transboundary basin water authority is a binational company formed in 1993 through a 1992 treaty on the Development and Utilization of the Water Resources of the Komati River Basin, which was signed between the Kingdom of Swaziland and the Republic of South Africa. Under this treaty, a Joint Water Commission (JWC) was established to play the role of technical advisory commission to advise the Governments of the Kingdom of Swaziland and the Republic of South Africa on water resources of common interest. Each of the two governments appoints three commissioners to the JWC for a determined period. Furthermore, each country nominates three members to the KOBWA Board of Directors for a period determined by the country concerned. The members elect their own chairperson for a period of two years. The elected members of the KOBWA Board are subject to the approval of the Joint Water Commission. Decisions taken at the KOBWA Board are by consensus or a simple majority. In case of equal votes the matter is referred to the JWC for a decision. KOBWA is fully funded by the governments of South Africa and Swaziland[47].

KOBWA designed and constructed Driekoppies Dam (and the Maguga Dam in Swaziland) and is currently responsible for operational and maintainance functions in both dams. Such functions include managing water allocation and distribution, environmental management (i.e. resource management and sustainable development and utilization) and stakeholder participation in decision making[48]. KOBWA reports to the Swaziland and South African Departments of Water Affairs, who are the two shareholders of the company. In the cae of Driekoppies Dam, the transboundary water authority does not directly engage with stakeholders, but does so through DWA, which then liaises with the Inkomati Catchment Management Agency (ICMA)[49], irrigation boards, water users, local government authorities and others. Mr E. Khoza, the KOBWA water bailiff, introduced the researcher to one of the security guards, who lived within the local community and knew some of the local fishers. The security guard provided information on fishing activities in Driekoppies Dam and attempted to link the researcher to some of the local fishers but was unsuccessful. Thereafter, Mr Khoza took the researcher on a field tour of the dam, with the objective to interview fishers found along the dam shore.

The research methods included interviews and questionnaires. The researcher introduced herself to all respondents, explained the purpose of the research and gave a brief outline of what sort of information was sought. The respondents were re-assured of their rights to privacy and that the personal information obtained would be used for research purposes by ACWR and the WRC. It was important for the researcher

[47] Interview with Mr Colin Zwane, KOBWA official responsible for Water Management, 19 September 2011.

[48] Sources: Internet [***http://www.kobwa.co.za/index.cfm?objectid=4E62A940-98B0-A404-FD3B60CE54F27991***]; Interviews with Messrs Ian Van Zuydam and Colin Zwane in March 2011.

[49] ICMA is a multi-stakeholder structure for the Inkomati basin in South Africa, and closely interacts with KOBWA.

to comply with these guidelines because of the arrests of illegal fishers that were common in the area. The challenges faced when collecting data in the Driekoppies study area were the unavailability of fishers and the officer responsible for dam environmental management at KOBWA. Recreational anglers went fishing before interviews could be conducted, while most of the informal subsistence fishers appeared to have 'vanished', despite preliminary assurances that many regularly fished in particular spots around the dam. The researcher waited for anglers and fishers to return from where they had gone and they did not return in time. The researcher was compelled to interview a KOBWA security guard, who was himself a subsistence fisher, about fishing activities in the area. Additional information was sought from a senior manager of the KOBWA office in South Africa. Furthermore, the researcher emailed interview questions to identified recreational anglers in Nelspruit, who have yet to respond, and to the Swaziland based head of KOBWA's Environmental Management Division, who later sent back answers to the questionnaire.

11.4 Background to the Study Area

11.3.1 Location

Driekoppies Dam is located in Ward 24 of Nkomazi Local Municipality in Mpumalanga Province. The area where Driekoppies Dam is located falls under Matsamo Tribal Authority (Nkomazi Municipality IDP Review 2010/2011). The dam wall is located between Schoemansdal and Middelplaas villages. The other villages surrounding the Driekoppies dam are Schulzendal and Jeppe's Reef. The main land use types are settlement and agriculture through irrigation. The nearest town, Malelane, is 45 kilometres away by road. Driekoppies dam lies south of Malelane along the Lomati River at Grid Reference ***25°43'0"S 31°32'25"E***. Driekoppies dam can be accessed via the main tarred road between Malelane and Jeppe's Reef (settlement at the border with Swaziland)[50]. The dam site lies within the summer rainfall region of Southern Africa and the catchment is prone to cyclonic storms[51].

11.3.2 Socioeconomic Profile

This section describes the socio-economic profile of Nkomazi Local Municipality, where Driekoppies Dam is located. The socio-economic profile includes population Figures, education, energy and employment. The 2001 Census enumerated 334 408 people in the Nkomazi Local Municipality, whilst the 2007 Community Survey states that the population was an estimated 338 095. In 2001 the Municipality had 57 settlements, 185 farm portions, 75 593 households and in 2007 the Community survey found that the households had increased to 78 254. The highest number of people is between the ages of 5 and 19 years. The Nkomazi Local Municipality population comprises of mainly Black Africans (99%) with only 1% being White. A quarter (25.4%) of the population had no schooling, 35% had attended school up to grade 0-9, 17.4% had attended up to Grade 10 and 11 whilst 16.5% had Matric only (Nkomazi Municipality IDP Review 2010/2011). In 2001 about 24% of the households had no formal income while about 60% of the household earned an annual household annual income of less than R 20,000. In 2008, almost 80% of the people were involved in undetermined sector, which may be anything ranging from self- employed to elementary work. The main employment sectors are agriculture, community services and trade. The unemployment rate was high most likely due to the rural nature of the area. The people were also less marketable due to shortage of skills and illiteracy (Nkomazi Municipality IDP Review 2010/2011).

11.5 History and Management of Inland Fishery

Driekoppies dam is part of the Komati River Basin which supplies water to South Africa, Swaziland and Mozambique. Construction of Driekoppies dam commenced in July 1993. KOBWA manages the dam and releases water to Mozambique and the surrounding communities[52]. Driekoppies Dam was completed in 1998 and is dam number X100-22 according to the Department of Water Affairs. It is used for irrigation and owned by KOBWA. The fish commonly found in the dam are large mouth bass, catfish and kurper. The fish in the Driekoppies dam are large as some fish have been found to weigh up to 4 kilogrammes[53].

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[50] Source: ***http://en.wikipedia.org/wiki/Driekoppies_Dam***

[51] Source: ***http://www.kobwa.co.za/index.cfm?objectid=03EC92BC-E0C4-BB9D-7AB8C2CF2BA36BE1***

[52] Source: ***http://www.kobwa.co.za/index.cfm?objectid=5050612B-E0C4-BB9D-70714735D736F3EE***

[53] Source: ***www.gobassing.com/display.php?Countries+South-Africa+Mpumalanga+Driekoppies***

11.6 Characterization of Indigenous Knowledge and Current Fishing Practices and Techniques

11.5.1 Findings from Key Stakeholder Organisations

Institutional interviews were held with two representatives from KOBWA. One was the water bailiff for Driekoppies Dam and the other was from KOBWA's Environmental Management division. The water bailiff is responsible for the operation and maintenance of the dam. Dam construction began in 1992 and the dam was built for irrigation downstream as well as recreational purposes. The dam is owned by the Swaziland and South African government. The role of KOBWA is operational maintenance and to supply water to farmers and monitor water quality along the rivers.

Figure 46 Driekoppies: Cars and boat trailers of white recreational anglers parked at KOBWA office

The recreational users are mainly whites from Nelspruit, Malelane and Johannesburg, who drive to the dam and use fishing boats (Figure 46). The fishers pay R80 per boat each time that they go to the dam. There is no policy in place for fishing because it would mean supervising and taking stock of fish but they do not have the resources at present. Sometimes KOBWA gets a person to come and check the species and how the fish survive and report to the Environmental Officer who is based in Swaziland. Recreational fishers started fishing in the dam in October 1997. The boats must be registered and, have a water worthy certificate and the pilot must have a licence to operate the vessel. The KOBWA water bailiff searches the boats when they come out of the water. They do not want people to harvest more than 3 fish. There is no law on boat size but they will soon be inspect them and spraying the boats to stop alien species and check for alien species. The KOBWA officials work in conjunction with the Parks Board to try and catch local illegal fishermen. The water bailiff performs dam patrols and pulls out all the nets that he finds in the dam. He also instructed the white fishermen to pull out all the nets that they may find in the water.

The water bailiff said that the local fishers were at times aggressive when confronted along the road. The local fishers float on logs, plastic boats or foam. One fisher drowned when he saw the bailiff coming and panicked. There are a few crocodiles at the tail of the dam and there have been a few attacks. On weekends, he alternates with his supervisor because the dam needs to be monitored at all times of the day throughout the year. The dam is open to fishers between 7.30am and 7.00pm. KOBWA started charging gate entrance fees in 2010 but before that it was free. Fees are variable, depending on the duration of stay and other factors (e.g. recreational angling or fishing, or braai picnic on dam shore). Often people come in groups, and entrance fees per day are around R100 per group. The fee is used for dam maintenance, that is, to clean the dam water and repair the place where erosion from boat landing takes place. The dam supplies water to the local municipality which purifies the water and supplies to the community.

The official from Driekoppies Dam stated the dam is state property and is managed by DWA. KOBWA assists with on-site management of the dam. According to KOBWA's Environmental Management division, the main uses of the Driekoppies dam are:

- To stabilize the flow in the Lomati River as well as in the Komati River downstream of its confluence with the Lomati River.
- To provide for the expected increase in primary water demand.
- To allow for a moderate increase in irrigation development.
- Together with the Maguga Dam, to improve the assurance of water supplies to existing irrigation and urban development in the Komati River Basin, and

- to provide for extended irrigation development on the right bank (southern side) of the Lomati River downstream of the dam, as well as along the Komati River upstream to the Swaziland Border.
- to stabilize irrigation water supply along the left bank (northern side) of the Lomati River downstream of the dam.

- To improve, as an essential requirement, the assurance of water supply required for the riverine ecosystems downstream of the dam.
- To provide for stock watering along the river downstream of the dam.
- To provide for the establishment of limited fishing in the reservoir.
- To enhance the possibilities for wildlife conservation.

The dam was used by informal fishers from the communities surrounding the dam mainly for subsistence purposes but also recreational and commercial purposes whereby nets were used. Other users included anglers who used the dam for sporting purposes. The informal commercial fishers sold the fish. The anglers would catch-and-release and sometimes keep the fish but only a limited number. At times the anglers released a certain species or fish size for conservation purposes and gave some of the captured fish to the neighbouring communities for consumption.

Some of the informal recreational anglers (i.e. not registered members of angling clubs) and subsistence fishers often do not have fishing permits. Others tend to harvest more than is permissible. KOBWA has therefore had to deal with issues of over-harvesting and suspected use of nets. Some of such offenders are members of the local Indian community, who constitute 35% of boat users. When these are apprehended, they often are found with between twelve and twenty fish in their boats. Since KOBWA does not have power to arrest and/or charge contraveners, company officials simply apply informal measures for deterring over-harvesting. These include confiscating all except the two permitted fish and warning offenders that their whole group might not be allowed into the dam in future, which would make them unpopular with their friends. So far, such measures have reduced over-fishing by this group, but not completely eradicated the practice. A more serious problem, however, is the hidden commercial fishing that takes place in the dam.

According to the respondent, illegal commercial fishing is done by local black people, who come into the dam at night to set up, wait and then collect their gill nets before daybreak. The fishers informally sell their catch within local communities and not to formal businesses entities (e.g. registered butcheries and retail shops) They go from house to house, often carrying a sack of fish on a bicycle, riding along narrow 'passages' (i.e. dusty back streets) and avoiding main roads. Members of local communities would not disclose information about the commercial fishers. KOBWA did not have the resources to monitor this activity, while the Parks Board often patrols during the day time. Consequently, it had not been possible to prosecute the commercial gill net fishers. In the meantime, KOBWA staff patrolled the dam to locate and remove gill nets. In such policing, they were assisted by recreational angling clubs. Despite these measures, however, sometimes gill nets were found which had been left uncollected by their owners for two days or more, with dead fish in them. This was a concern since such practice impacted negatively on water quality (since the dam supplies domestic water) and on the environmental integrity of the dam.

KOBWA hoped to gain the buy-in of the community authorities and law enforcement for sustainability of the awareness campaign. The organisation was also trying to forge a close working relationship with the Mpumalanga Parks Board to ensure that all necessary documents, such as fishing permits, are readily accessible to local communities and visitors to the dam even on non-working days, when people most likely go out and enjoy themselves by fishing. Key stakeholders in inland fisheries, in particular for Driekoppies dam are DAFF, KOBWA, the local Traditional Authority, fishers (formal & informal), anglers and peri-reservoir communities. Ms. Noqayi believed that the construction of the dam and other obstruction points with the Komati River created barriers for fish migration. This implied that stakeholders downstream of the reservoir and weirs had totally different needs compared to their counterparts upstream and more so because of the alteration of habitat and extinction of certain fish species. KOBWA is a key stakeholder in the management of Driekoppies dam as it plays an active role in monitoring the activities at the dam. The representatives gave clear insight on the institution's role as well as the fishing activities in the dam.

KOBWA's Environmental Management division was concerned about illegal fishing using nets. At the time of the interview, the issue was being addressed through launching a fish conservation awareness campaign. The aim was to educate the communities on acceptable fishing methods, importance of acquiring a fishing permit to deal with issues of unlimited harvesting and protection of stock during breeding periods, awareness about the zoned areas in the dam itself, understanding of the conservation of the fish as source of food, fish farming and to promote an understanding of fish through sport. A similar campaign which was launched in 2009 is on going in Maguga dam, which is also managed by KOBWA.

11.5.2 Findings from Rapid Appraisals of Fishers and Local Key Respondents

The only fisher interviewed from Driekoppies dam was a 54 year old who lived in a household of 12 people. He was unemployed but received a child grant, whilst the wife received a disability grant and his/her mother an old age grant. He informed the researcher that the government consulted with the local people prior to construction of the dam. The government promised the local people jobs, fish and water and that a company would invest in aquaculture and irrigation. However, nothing that was initially said has been fulfilled. The people that were involved in dam construction were Swazi and the fisher believed that the dam belonged to the people of Swaziland. The people from Maputo, Mozambique get water from the dam but have to ask for water to be released. The fisher had been fishing ever since the dam was built. He said that, at present, white women fish as well as locals and outsiders. He fishes for subsistence and recreational purposes. He caught bass, catfish and another species that looks like a snake. He used rods that he bought from Malelane. He said the bait was expensive and fish only wanted the bait that was purchased. He fished two or three times per month and also fished in the Lomati River. It depended on the breeding season because he did not fish during that time (August/September). The whites had fishing competitions to see who caught the biggest fish. There is a specific time to allow fish to breed then they go and catch after the breeding season. The organised recreational fishers do not catch fish less than 30 centimetres long, if they do catch them, the release the fish. The fisher was shown how to detect if a fish is pregnant by the white fishermen. So when he caught a pregnant fish, he released it back into the water so that it could deliver. He usually caught 4 or 5 fish which he ate with his family. Other informal fishermen use nets and this worried him because the use of nets resulted in all sizes of fish being caught. He felt that it was necessary for there to be security to guard the dam and avoid net fishing. Fishing was organised for recreational fishers but not for commercial fishers. He said KOBWA made the rules. He was concerned about personal safety because of the presence of rocks, crocodiles and snakes. He also mentioned that if a person went too close to the spillway, they could be pulled over. His other concerns were about people who throw bottles and other litter into the water and urinate in the water. He was not worried about over-fishing.

11.7 Discussion and Conclusion

Driekoppies Dam presents an interesting case study as it indicates a very active management authority in the form of KOBWA, which is a transboundary company jointly owned by the governments of South Africa and Swaziland. In the case of Driekoppies Dam, KOBWA reports to DWA and does not liaise directly with stakeholders, except in day-to-day operational functions relating to recreational fishing and similar activities in the dam area. Like many other dams in South Africa, Driekoppies has an actively involved formal recreational angling sector, which is mostly white and formalized, a predominantly black subsistence fishing sector, which is mostly informal, and a predominantly black commercial gill net fishing sector, which is informal, hidden and operates outside the ambit of existing regulations.

Whereas findings elsewhere in the Western Cape[54] show in dams that are controlled by irrigation boards, members of such boards exert very active control over access and resource use due to their vested interests, this study found that members of recreational angling clubs are not necessarily members of irrigation boards. As such, the exclusion of black fishers and negative sentiments about Indian anglers/fishers seem to be more strongly linked to traditional conservationist views about uncontrolled informal fishing practices than the exclusionist tendencies of recreational angling clubs, although the latter's influences can not be entirely ruled out since the clubs have a vested interest in the dam.

[54] According to Peter Britz's comment (05 September 2011).

It would also appear that KOBWA's staff occupies a difficult position whereby they have to enforce rules that are clearly inequitable, since it is logistically difficult for resource-poor local subsistence fishers to obtain fishing permits and pay the gate entrance fees on a day-to-day basis. Consequently, it seems that such constraints have driven some of the informal fishing activities underground, with local communities evidently regarding such activities as legitimate and therefore conspiring to keep them hidden. Under such conditions, commercially-orientated fishing practices have flourished alongside subsistence fishing. A key question for this case study is whether or not the local informal fishers who sell their catch can be defined as 'subsistence' fishers, in the broader sense of the term, or 'commercially-orientated' fishers. The latter implies that the fisher's primary motive is to feed his household while selling the surplus, while the latter denotes that the fisher's primary motive is to sell fish and secondarily (perhaps) to eat the surplus from sales. Further research is needed to clarify this question, as well as determine the prevalence of both subsistence and commercially-orientated fishing.

Although the researcher did not manage to interview many stakeholders for Driekoppies dam, the information obtained from the water bailiff, fisher and households was insightful. When compared to information obtained for Pongola dam, it helps to understand why visitors staying in the lodges also take the fishermen's boats and nets. The visitors would most probably have been asked to do so by the authorities responsible for the dam. There is a need to contact and interview more local fishers from Driekoppies, particularly those who fish for commercial purposes. The fear of arrest has resulted in the fishers not being open to talking to people that they do not know.

In conclusion, a fish conservation awareness campaign for Driekoppies Dam fishery could assist in the process of educating fishers, especially in terms of acceptable fishing methods. This could lead to less illegal fishing if the campaign is well implemented and with the active involvement of fishers and other key stakeholders. Such participatory approach is requisite for fishery co-management and implementation of necessary corrective measures.

11.8 References and Bibliography

http://en.wikipedia.org/wiki/Driekoppies_Dam Retrieved on 06/05/2011

http://www.gobassing.com/display.php?Countries+South-Africa+Mpumalanga+Driekoppies Retrieved on 06/05/2011

http://www.kobwa.co.za/index.cfm?objectid=5050612B-E0C4-BB9D-70714735D736F3EE Retrieved on 06/05/2011

http://www.kobwa.co.za/index.cfm?objectid=03EC92BC-E0C4-BB9D-7AB8C2CF2BA36BE1 Retrieved on 06/05/2011

Nkomazi Municipality Integrated Development Plan (IDP) Review 2010/2011

Retrieved from ***www.nkomazi.gov.za*** on 06/05/2011

12 MASIBEKELA DAM, MPUMALANGA PROVINCE

Figure 47 Masibekela Dam

12.1 Introduction

This section of the report outlines background information and findings made from fieldwork undertaken on Masibekela Dam in Mpumalanga Province. Fieldwork was undertaken around Masibekela on the 31st of March 2011. The research was undertaken by prospective PhD candidate, Ms Vimbai Jenjezwa.

12.2 Methodology

In order to prepare for community entry in Masibekela, the head researcher, Mrs B. Tapela spoke to the ward councillor to inform her of the researcher's intention to visit the Masibekela community and explained the purpose of the visit. The researcher liaised with a member of the community who worked for the Water Section (Maintenance) of Nkomazi Local Municipality.

Data collection methods included interviews and questionnaires. Respondents ranged from representatives of local organisations, such as traditional leadership and government officials, to fishers and key resource persons from among ordinary members of local communities. The researcher introduced herself to all respondents, explained the purpose of the research and gave a brief outline of what sort of information was sought. The respondents were re-assured of their rights to privacy and that the personal information obtained would be used for research purposes by African Centre for Water Research (ACWR) and the Water Research Commission (WRC). It was important for the researcher to comply with these guidelines because of the arrests of illegal fishers that were common in the area.

Challenges encountered when collecting data from Masibekela Dam area included the reluctance by a few people to complete the household questionnaire. One respondent refused to answer any more questions after having been asked about household income from fishing. After further explaining the nature of the research, the respondent still refused to continue. Despite such sensitivities, a greater number of respondents were keen to participate in the research.

12.3 Background to the Study Area

12.3.1 Location

Masibekela Dam is located in Ward 14 of Nkomazi Local Municipality in Mpumalanga Province. The dam is located to the east of Mananga Border Gate to Swaziland. The dam is surrounded by Mananga, Thambokhulu, Mbuzini, Khombaso and Masibekela rural settlements.

12.3.2 Socioeconomic Profile

This section describes the socio-economic profile of the Nkomazi Local Municipality where the dams are located. The socio-economic profile includes population Figures, education, energy and employment. The 2001 Census enumerated 334 408 people in the Nkomazi Local Municipality, whilst the 2007 Community Survey states that the population was an estimated 338 095. In 2001 the Municipality had 57 settlements, 185 farm portions, 75 593 households and in 2007 the Community survey found that the households had increased to 78 254. The area where Masibekela dam is located falls under Mlambo Tribal Authority (Nkomazi Municipality IDP Review 2010/2011). The highest number of people is between the ages of 5 and 19 years. Levels of formal education were generally low. Household incomes were also relatively low.

The main employment sectors were agriculture, community services and trade.

12.4 History and Management of the Inland Fishery

The List of Dams by the DWA Dam Safety Section shows that Masibekela Dam is number X103-92 and was built in 1996. According to a key respondent, Mr Masereka, who is a Nelspruit-based senior official of the provincial Department of Agriculture, Rural Development and Land Administration (DARDLA), the dam is owned by DARDLA, and was built for purposes of irrigating sugar cane in smallholdings nearby[55]. The dam development plan envisaged that water would be pumped from Nkomazi River during the rainy season and stored in Masibekela Dam, for use in the drier months, when river flow is low. However, after dam construction, it was found that the dam catchment was large enough to provide sufficient water and the planned abstraction from Nkomazi River was abandoned. In the respondent's view, DARDLA is responsible for controlling access to the dam. However, the department is mostly concerned with irrigation issues, including water quantity and quality, and has no knowledge about fishing activities taking place in the dam. The respondent further said that fishing activities are not necessarily in conflict with irrigation, and if there is scope for them to be promoted, then DARDLA would support that.

In effect, though, there appeared to be no visible formal management authority for Masibekela Dam fishery other than Mpumalanga Parks Board rangers, who arrested fishers and anglers caught without fishing licences or using nets. The dam is surrounded by rural communities, where traditional authorities, such as chiefs and their traditional councils, control access to land and other natural resources. Apart from a few irrigated smallholdings of sugar cane at the lower reaches of the dam, Masibekela Dam is surrounded by rural communal land. Communal land areas close to the dam is allocated to uses, such as rangelands and rain-fed cropfields, in which livestock grazes during the post-harvest winter season. Although the Masibekela Dam is relatively new infrastructure, which means that fishing activities in the dam are a recent phenomenon, there seems to have emerged a sense of a 'common pool resource', similar to but less well-developed than in the case of Makuleke. A precursor to this development has been that local fishers, who mostly use fishing rods, realized that artisanal fishers from neighbouring Mozambique were harvesting a lot of fish (approximately four 25 litre buckets per boat per day) using boats and nets and selling the fish to members of local communities[56]. The local subsistence fishers and informal recreational anglers became concerned that the fishery would be fished out. Although the local chief and fishers are unhappy about what they perceive to be uncontrolled access and overfishing, they are unable to effectively define and implement rules of access.

[55] Interview with Mr Masereka, 19 September 2011.

[56] Preliminary interview with local respondent, Mr Moses Mabuza, 20 January 2010.

12.5 Characterization of Indigenous Knowledge and Current Fishing Practices and Techniques

12.5.1 Findings from Local Key Stakeholder Organisations

The researcher interviewed the *induna* (i.e. chief), Mr Mazibuse Nkalanga. He did not know his age. He said that the dam was built for irrigation purposes. He allowed people to fish but not to go deep inside the water. People started fishing in 1995. There were no traditional practices related to fishing. He said the dam belongs to Mlambo Tribal Authority which is in charge of the whole area. The Mpumalanga Department of Agriculture Rural Development and Land Administration (formerly known as the Department of Agriculture and Land Administration) used to control who had access to the dam but not anymore. The Mpumalanga Parks Board arrests people found fishing in the dam without a permit. The induna did not eat fish. Mr Nkalanga did not want Mozambican fishers to fish in the dam. The locals and the induna would report Mozambicans to the Parks Board because, in the chief's own view, the outsiders would not have asked him for permission and the dam belonged to his community[57]. He said his roles were to control community disputes and give people stands and plots for farming.

12.5.2 Findings from Rapid Appraisals of Fishers and Local Key Respondents

The researcher interviewed three fishers from the Masibekela community and one recreational fisher from outside that community. The first fisher, a male full time mechanic aged 45 fished at the Masibekela Dam. He had been a fisher for 7 years. He said that some females but mostly men from Masibekela fished from the dam. People from Mangweni, Khombaso, Mananga and Mbuzini also fished from the dam. On weekends, some white recreational fishers came to fish. His reasons for fishing were subsistence and commercial. The species that he caught were catfish, "sardines" and "spero". He used a hook and bait which was sold for between R5 and R15 per packet. He owned a boat that he had made himself. He went fishing twice a week on Saturdays and Sundays early in the morning and afternoon because this is when the fish eat. In winter, he could only catch catfish species, but had to leave the rods in the evening and remove them the following morning. He ate some his catch, and sold the rest to people who would have asked for or paid for the fish prior to him going fishing. He sold the fish to the community for between R1 and R10. Sardines were sold for between R1 and R5 whilst catfish were sold for R10. On average, he made R250 a week. There were no crocodiles but the fishermen were concerned about law enforcement by the Parks Board. He said that at times the Chief would warn the fishers that the Parks Board people were about to visit the area. The fishermen were supposed to pay R20 per year for a fishing permit. This was supposed to be paid in Komatipoort but it coast R40 to get there and back.The fisher had no concerns about outsiders fishing or over-fishing. His only concern was about arrests by the parks board. He wished that the local fishermen could get permission to fish.

The second fisher had been fishing ever since he was 12 years old. He said that both old and young men and females fished. His reason for fishing was subsistence. The species that were found in the dam were sardines, catfish and *machan* fish. He used a self-made or purchased (R18-R21) fishing rod. The bait used was chicken guts which cost between R6 and R8. Sometimes he used a net that he bought in Maputo. He fished twice or thrice a week in the morning at 0600 and usually left at 1200 noon. He did not fish in winter because of the cold weather. He ate the fish fresh and did not sell any. He ate the fish with his family and friends who visited his homestead. The people who sold fish, sold from buckets and charged between R150 and R250 for a number of fish. He feared crocodiles and arrest. The fishers asked the leadership to help them get permits but they said that they do not do that.

The third fisher said that the dam was used for irrigation of sugarcane. He learnt how to fish from the older fishers and had been fishing for 4 years. Few females fished but no children. The type of fish he caught was catfish and *sbero*. He used a net, size 4 which he bought from Figtree for R200. He also used a fishing rod and his bait was locusts. He fished every second day in the morning up until around 4pm. He also fished

[57] Cross-referencing with information from other respondents (e.g. Mr Masereka of the provincial Department of Agriculture, Rural Development and Land Administration, interviewed on 19 September 2011), the dam was built by the provincial Department of Agriculture originally for purposes of irrigating sugar cane in smallholdings nearby. However, as in the case of Makuleke, there is a sense of a 'common pool resource', owing to the fact that the dam is surrounded by rural communities, where traditional authorities (e.g. chiefs and the councils) control access to land and other natural resources.

in winter. When he sold, he sells in Masibekela, Tonga and Naas. He sold the fish for R10 for four or five depending on the size. He made approximately R300 a week. His only concern was arrest. His fish were confiscated in March by SAPS and he was told not to fish again.

Another local respondent was a 66 year old who works fulltime at the Water Section of Inkomazi Local Municipality and has been fishing in Masibekela Dam since the nineties. The people he saw fishing in the dam were mainly men and at times (rarely) whites. He fished for subsistence and recreational purposes. The fish species he caught were sardines, catfish and black carp. He used a hook attached to twine which was attached to induku. He fished once in a while.

12.6 Discussion and Conclusion

The key issues at Masibekela dam were the arrests of informal fishers. This was also the case in other areas such as communities surrounding Pongola and Driekoppies Dams. There is a discord regarding the practice of fishing by local fishers and the law together with law enforcement agents. Although the fishers fish illegally, they take the risk because for some it is their only means of survival.

Fishers in Masibekela dam include people from the surrounding villages and towns who are employed and fish for mainly recreational and also subsistence purposes. Therefore, the area has potential to be used for income generation by making recreational fishers pay a fee for fishing. However, this would require a unit that would be based at the dam to monitor the dam and the users, such as KOBWA at Driekoppies dam. These fishers could then supply shops in and around Masibekela. However, infrastructure such as fencing and an office for monitoring fishers would need to be first put into place.

In conclusion, in order for a fishery to be developed at Masibekela dam, there seems to be a need for formal fishery governance and management structures. An initial step would be for DAFF to establish a relationship with the fishers whereby fishers are taught about sustainable fishing and the importance for having permits. The fishers would also have to organise themselves and form a committee which would make it easier to communicate their problems and coordinate their activities.

12.7 References and Bibliography

Nkomazi Municipality Integrated Development Plan (IDP) Review 2010/2011

Retrieved from ***www.nkomazi.gov.za*** on 06/05/201

13 ROODEKOPJES DAM, NORTH WEST PROVINCE

Figure 48 Entrance to Roodekopjes Dam

13.1 Introduction

Research on Roodekopjes Dam fishery was undertaken on the 20th of June 2011. The researcher was Ms Vimbai Rachel Jenjezwa and the research assistant was Mr Attorney Gezane Hlongwane. The fieldwork was undertaken using the 'creel survey' method. In preparation for fieldwork, the principal researcher at ACWR consulted relevant officials in the North West Provincial Department of Agriculture Conservation and Environment (DACE) and the DWA Regional Office at Haartebeespoort Dam. No community leaders in the area were consulted prior to the researchers' visit.

13.2 Methodology

The research methodology used was interviews through the creel survey method. Upon arrival at Roodekopjes Dam, researchers met one male fisher, who was on his way to fish. He was the only fisher interviewed due to the absence of other fishers on the day of fieldwork. The researchers complied with ethical guidelines for social research by explaining the purpose of the research and assuring respondents that the information they supplied would not be used for other purpose than those pertaining to the WRC research on inland fisheries. Respondents were also informed that they were free not to divulge any information that they were not comfortable with providing. Problems encountered when undertaking fieldwork included the unavailability of fishers. It was also difficult to contact institutional representatives through telephone calls and/or obtain timeous responses through e-mails.

13.3 Background to the Study Area

13.3.1 Location

Roodekopjes dam is located 30 kilometres north west of Brits in the North West Province. The dam is within Madibeng Local Municipality. The dam lies west of the road R511. The dam is situated a few kilometres downstream from Hartebeespoort Dam on the Crocodile River[58]. The nearest town is Brits whilst surrounding villages include Hartbeestfontein-A, Modikwe and Bethanie. The main land use types around the dam are agriculture (crop production) and tourism in the form of fishing and lodges.

13.3.2 Socioeconomic Profile

According to the 2007 community survey, the population of Madibeng Local Municipality was 371 197 and there were 96 361 households. 90.8% of the population was African whilst 8% was white. The largest population group is those of between 15 and 34 years of age. The municipality has a diverse economy which includes agriculture, mining, manufacturing and tourism sectors. Levels of access to social services are generally relatively low.

13.4 History and Management of the Inland Fishery

Roodekopjes dam is owned by the Department of Water Affairs (DWA). The dam was built in 1986 for irrigation, domestic and industrial use. In 1985 a channel was built to convey water from the new Roodekopjes dam to the nearby Vaalkop dam (J.van der Walt, C. Van der Walt & Ceronio, 2004). According to a representative

[58] Source: ***http://www.bassfishing.co.za/north-west/roodekopjes-dam***

of Northern Gauteng Artificial Lure Angling Association (NGALAA), Advocate Bernard Venter, recreational fishing by anglers affiliated to the organization actively started about thirty (30) years ago, which was not long after the dam was built in 1986[59]. Currently, there is a high level of recreational angling activity on the dam[60], and the venue is popular for angling competitions, which target carp and catfish. For example, the dam is currently a fixture on the Gauteng leg of the SA Bass Cast for Cash tournament trail. However, there have been changes to the fishery over the years. Fishing used to be much better years ago, but the water in the fishery now polluted and there has been an increase in unlawful gill netting. Spraying of hyacinth has also been detrimental to water quality and fish and bird habitats. For example, reeds along the shores are killed by chemicals intended to control the invasive water hyacinth.

The types of fish species caught by recreational anglers in Roodekopjes Dam include carp, catfish, blue kurper, vlei kurper, dwarf kurper, canary kurper, large mouth bass, silver catfish, river sardine, ghielemeintjies, lead fish, mosquitofish, yellowfish and papermouth. Kurper species, makriel, yellowfish, papermouth and small species numbers have dwindled due to water pollution and unlawful gill netting. There were problems in the past with numbers of large mouth bass which decreased. However, the population has since increased to a reasonable level. The normal size fish caught is 1 kilogramme but fish up to 4 kilogrammes have been caught[61]. Members of the recreational club dispose of their catch in various ways. They mostly catch and release, but sometimes will share a part of the catch with local people.

The survey revealed that there are multiple formal and informal stakeholders, and overlaps between institutional jurisdictions, property rights and interests in Roodekopjes Dam fisheries. Local subsistence fishers perceive that, although the dam is used by white recreational anglers and black subsistence fishers, white people have greater access to the dam. The white anglers sometimes chase away local fishers found fishing using rods (i.e. not the illegal gill net users), on the basis that the land around the dam is owned by white people. In the view of the NGALAA representative, however, rules governing access to Roodekopjes Dam fishery are made by various institutional actors and structures, depending on administrative jurisdictions and property rights applying to given portions of land around the dam. For example, where there is private land ownership, access is often via private resorts. However, given that the dam is public property, access to the fishery is also governed by national and provincial legislation. Water and infrastructure management falls under DWA, while ecological management falls under the Department responsible for Nature Conservation. Responsibility for managing Roodekopjes fishery resources principally vests with national and provincial/ regional government departments responsible for Water Affairs and Nature Conservation. However, in the respondent's view, these departments are failing NGALAA, whose concerns are:

- That the numbers of many species has dwindled.
- Personal safety and security risks, such as crime, water pollution and crocodiles.
- The invasive water hyacinth, which creates problems for anglers.

According to the respondent, the angling club was not concerned about members of local communities fishing on the dam, so long as they used legal angling methods and not gill netting and poaching. This finding contrasted with earlier findings by Rouhani (2004) that unregulated fishing is a concern, because of issues such as organized illegal gill-net fishing, insufficient toilet facilities and littering whereby discarded fishing lines result in birds getting entangled, injured and dying.

13.5 Characterization of Indigenous Knowledge and Current Fishing Practices and Techniques

13.5.1 Findings from Key Stakeholder Organisations

The principal institutional actor consulted was Mr Daan Buijs, who is the Assistant Director responsible for Fishing Permits in the North West Provincial Department of Agriculture Conservation and Environment

[59] Interview with Bernard Venter, 02 August 2011.

[60] Confirmed by Mr Daan Buijs of DACE, who is the officer responsible for fishing permits (interview held in March 2011) and subsistence fisher Mr Phaswane (see Section 12.3.2.1).

[61] Source: ***http://www.bassfishing.co.za/north-west/roodekopjes-dam***

(DACE). He outlined the background to and current *status quo* of fishing activities in Roodekopjes Dam fishery and, for additional information, provided a copy of a "Report on the survey of selected large dams in the North West Province: With a view to develop fisheries" (Rouhani, 2004). This section largely draws from this reference.

The report states that the Roodekopjes dam is managed by DWA whilst most of the land surrounding the dam belongs to private individuals. According to the report, Crocodile River is one of the most polluted rivers in the country due to treated and raw effluent from the Gauteng area that is discharged into the river. Commercial farming is the most common land use type in the Roodekopjes dam catchment. The dam is managed by DWAF, and a major portion of the land around the dam belongs to private individuals. However, a section of one of the "arms" of the dam is bordering a tribal area. In 2004, all of the stakeholders were in the process of forming a Water Users Association (WUA), through DWA (Rouhani, 2004). This study found that the earlier attempts to establish a WUA had floundered, and there is currently no WUA in the Upper Crocodile sub-catchment (A21)[62]. A key issue of concern for stakeholders, however, is the contribution of mine dewatering on the surface and groundwater resources within the Roodekoppies Dam catchment and the possible negative impact on both users and the environment (DWAF 2004 in DWA, 2009)[63]. DWA is currently engaged in a major Remediation Project on Hartebeestpoort Dam, which is within the same system as Roodekoppies Dam. Such remediation involves restructuring of dams in the North West, in terms of a new Aquaculture Strategy, and to use pollution to breed fish[64]. The project will be rolled out to all dams in the North West.

Figure 49 Roodekopjes: Water hyacynth infestation and litter left by fishers

The water in dam is alkaline, very hard and relatively clear. These characteristics meant that the dam should be highly productive and have large fish populations. The pollution from the Crocodile River is likely to have an influence on the fish population. Inspection of the dam revealed that litter from recreational anglers and, fertilizer and pesticides associated with commercial farming in the catchment of the dam could be additional sources of pollution. Large quantities of fertilizers may cause eutrophication (Rouhani, 2004). Field observations revealed that water hyacinth, which is an invasive alien water weed, extensively infested the dam (Figure 46).

13.5.2 Findings from Rapid Appraisals of Fishers and Local Key Respondents Fishers from Rural Local Communities

The only fisher interviewed during fieldwork was a man born in 1946 (Figure 50). He survived on a pension. Before retirement, he worked on one of the surrounding farms for 12 years.

The fisher said that the main uses of the Roodekopjes dam are fishing using boats which are mainly used by whites. Water is taken to Vaalkop dam to supply water to the mines (New Northam, Amanda Belt). He did not know of any traditional knowledge. He had been fishing for a long time round about 1962/3 when he started working in the area. This was before the dam was built. The people who fish in the dam are whites from Bethanie, Modikwe, Brits and Rethabile. Some locals also fish for subsistence purposes. People who work on the farms fish usually on weekends when they are off. These are usually about five. Villagers fish during the weekends and holidays. One or two may fish during the week when they are not working. These

[62] Interview with Mr Petros Venter of the DWA North West Regional Office, 20 September.
[63] Confirmed by Mr Petros Venter (DWA) and Prof. Liz Greyling of Hartebeestfontein Conservancy, 20 September, 2011
[64] Further details will be appended to this report.

fishers all used fishing rods and not nets. The fishet said white people fish for recreational and commercial purposes. Some white fishers sold the fish in the villages, in town or to other white farm owners. The white fishers also use cast nets. The type of fish caught includes carp, blue kurper, *getle* (bream), *muchekecheke* (known as mwenge in Shangaan), catfish and shellfish. The most common fish species were catfish and carp. The fisher used bread as bait and a self-made rod with twine and a hook. In winter, he did not fish often, but in summer he fished every day. He fished early in the morning or from 4pm until late.

The respondent reported that white fishers sometimes chased local fishers found fishing using rods. A local fisher was once shot in the hand. He said that white people rdont allow locals to fish because they own the land around the dam. He did not fear crocodiles but had heard of a place where crocodiles are kept. He said that one day 13 crocodiles escaped from their holding place and got into the dam water. Only one was found dead. The owner of the crocodile farm wanted to call specialists to catch the ones that had escaped but other farmers refused because they thought the crocodiles would deter illegal fishers. Before the crocodiles escaped, locals could go inside the water and put their fishing nets. Since these people did not have a source of income anymore, they had started robbing people. He had no concerns about outsiders fishing because he felt the dam was the outsiders' only fishing resource available to them. There were problems of crimes committed by homeless people who slept under the bridge. There were alien plant species in the dam and these are sometimes sprayed by the whites and government. The dam was still being cleaned up.

The fisher further stated that a competition is sometimes held at the dam, whereby about 50 fishers in boats compete to catch the biggest fish. Black people come and fish from the dam wall and not from the recreational fishing camps. When a black person was found with a boat, white people call the rangers. Rangers from DACE have a camp close to the dam. They are privately hired by white people, who own the fishing camps. The rangers are retired policemen. When caught fishing, the illegal fishers are beaten up but rangers do not confiscate the fisher's fish or gear and tackle material. The respondent also said that there is a lot of crime in the Roodekopjes Dam area, such as cellphone theft and rape. However, such crime has decreased since rangers started operating. In his view, dam water is very dirty. When Hartebeespoort was opened, this made Roodekopjes water dirty. Before this, the water was clean. However, fish in Roodekopjes Dam has not been as severely harmed as that in the Rustenberg Dam. In the latter dam, fish were suffocating because of pollution by acid mine waste and contamination by sewage and effluent.

Recreational Angling: Northern Gauteng Artificial Lure Angling Association (NGALAA).
A member of NGALAA said that although the club fished in the dam, fishing had decreased and some fishers last fished in Roodekopjes last year (2010). The reason for this was the polluted state of the water. Further written responses to interview questions were obtained from the Secretary and Conservation Officer for NGALAA (Venter, 2011).

The main objectives and interests of NGALAA, with respect to inland fisheries, relate to recreational angling. Membership of NGALAA, which is a Pretoria-based angling club, stands at one hundred and twenty (120) members (Venter 2011). NGALAA is affiliated to several larger umbrella organizations. One of these is the South African Artificial Lure Angling Association (SAALAA), which has branches in all provinces in South Africa. NGALAA was also affiliated to South African Sport Angling and Casting Confederation (SASACC) as well as South African Sports Confederation and Olympic Committee (SASCOC) (Venter, 2011).

Figure 50 Roodekopjes: Subsistence fisher preparing handlines next to hyacynth infested dam

With specific reference to Roodekopjes Dam, members of NGALAA became actively involved in recreational fishing in the dam about thirty (30) years ago, which was not long after the dam was built in 1986. The types of fish species caught by recreational anglers in Roodekopjes Dam include carp, catfish, blue kurper, vlei kurper, dwarf kurper, canary kurper, large mouth bass, silver catfish, river sardine, ghielemeintjies, lead fish, mosquitofish, yellowfish and papermouth. Kurper species, makriel, yellowfish, papermouth and small species numbers have dwindled due to water pollution and unlawful gill netting. Members of the recreational club dispose of their catch in various ways. They mostly catch and release, but sometimes will share a part of the catch with local people. Currently, there is a high level of recreational angling activity on the dam, and the venue is popular for angling competitions, which target carp and catfish. However, there have been changes to the fishery over the years. Fishing used to be much better years ago, but the water in the fishery now polluted and there has been an increase in unlawful gill netting. Spraying of hyacinth has also been detrimental to water quality and fish and bird habitats. For example, reeds along the shores are killed by chemicals intended to control the invasive water hyacinth.

Regarding rules and guidelines for fishing techniques (including gear and tackle) and practices, NGALAA provides clearly-defined guidelines and rules for its members. For example, each angler is allowed to practice using 'only fishing tackle' and not nets. Other examples are 'catch one fish per species', 'target as many different species as possible', use 'artificial lures only', 'catch and release' and carry out angling 'mostly from boats'. Such rules and guidelines are made by SAALAA (Venter, 2011). Rules governing access to Roodekopjes Dam fishery, however, are made by various institutional actors and structures, depending on administrative jurisdictions and property rights applying to given portions of land around the dam. For example, where there is private land ownership, access is often via private resorts. However, given that the dam is public property, access to the fishery is also governed by national and provincial legislation. Water and infrastructure management falls under DWA, while ecological management falls under the Department responsible for Nature Conservation. The multiplicity and overlaps between institutional jurisdictions, property rights and interests in Roodekopjes Dam fishery points to a need to clarify access rights to and governance responsibilities over the fishery.

Responsibility for managing Roodekopjes fishery resources principally vests with national and provincial/ regional government departments responsible for Water Affairs and Nature Conservation. However, in the respondent's view, these departments are failing NGALAA, whose concerns are outlined below:

- A major concern for NGALAA is that the numbers of many species has dwindled.
- NGALAA is also concerned about personal safety and security risks, such as crime, water pollution and crocodiles.
- Another concern is about the invasive water hyacinth, which creates problems for anglers.
- The angling club is not concerned about members of local communities fishing on the dam, so long as they use legal angling methods and not gill netting and poaching.

A key issue is that Roodekopjes and most dams in the bushveld region of North West Province are not suitable for the sustainable development of inland fisheries (Venter, 2011). Reasons include the following:

- Numbers of many indigenous species, such as yellowfish and blue kurper in particular, have dwindled;
- Netting will have a negative effect on these indigenous species;
- The dams have plenty of obstructions, like trees, rocky beds and water hyacinth, which make trek netting difficult;
- Many of the dams still have crocodiles and sometimes hippos.

By contrast, the bigger dams on the Highveld areas are loaded with carp, which is an alien species and not threatened. Structures of those dams are much better for netting.

In light of reported conflicts between recreational anglers and subsistence fishers, a question was asked on possible mutually beneficial ways by which recreational anglers and subsistence fishers might coexist

in and around Roodekopjes Dam. Adv. Venter began by reiterating the view that Roodekopjes Dam is not suitable for sustainable inland fishery development, given the dwindling of indigenous species and multiple obstructions to trek netting. Further to that, he asserted:

> *We are not against fisheries, but get the right location, target the right species, certainly not indigenous species (barbel excluded, because they are not endangered) and first get security under control where you operate fisheries. If you take the commercial value of angling into account, you may losing more than gaining if you destroy the recreational and sport angling. See Prof Leibold from Univ of Stellenbosch report on the commercial value of angling in South Africa.*

A follow-up on the reference to Leibold & Van Zyl (2008) reveals that, nationally, approximately 12,000 artificial lure anglers in South Africa participate in various recreational activities, such as competitions. A tenth (10%) or 1,200 of these are formal anglers, who are registered members of formally constituted artificial lure angling clubs. The majority (over 10,800) are informal anglers. The Direct Economic Impact of artificial lure recreational angling is R267.6million, while the Indirect Economic Impact is R47.1million, giving a Total Direct and Indirect economic impact of R314.7million per annum. Taking into account the added Total Induced Economic Impact (R6.62million where variable induced cost multiplier is 5%) and subtracted Economic Outflow (R55million as % factor on capital values), the Total Economic Impact of Artificial Lure Angling is R267million per annum. The Economic Impact per Participant (R267million ÷ 12000) is R22,250 per person *per annum*. In other words, the average annual expenditure per person by formal and informal artificial lure anglers, who participate in competitions and related activities, is R 22,250 per year.

13.6 Discussion and Conclusion

Findings show that the main fishing activities are undertaken by recreational anglers, particularly artificial lure anglers. This type of recreational angling makes significant economic impact. The existing and potential economic value of recreational angling needs to be considered in interventions to promote the sustainable development of inland fisheries and contributions to rural livelihoods. Given the high cost (expenditure of R22,500 per angler per year) of participation by both formal and informal anglers in this sport, it is not feasible that the majority of resource-poor fishers from local communities can afford to actively take part in this type of fishing practice. There is also a need to examine ways to resolve on-going conflicts between recreational anglers and subsistence fishers in Roodekopjes Dam.

While the importance of recreational angling in the dam is understood, the significance of subsistence fishing remains unclear. Based on the findings from Mr Paswane and research undertaken by Rouhani (2004), most of the illegal commercial fishers are foreigners. Therefore, the locals may not support the development of a fishery that employs mostly foreigners. It is thus necessary to establish if there are enough local fishers interested in developing a fishery before plans to develop a fishery are put into place. There is also need for research into whether or not the pollution is affecting the fish population.

Similarly, although allusion is made to the existence of informal commercially-orientated gill net fishing in Roodekoppies, such fishers were not encountered during this study's field surveys. Comparing Rouhani's (2004) findings with findings from this study's interview with Paswane, it would seem that the number of gill net fishers may have decreased over the years. The decrease can be attributed to rangers who patrol and beat up illegal fishers. However, since researchers surveyed one part of the dam during daytime, it is possible that there may still be gill net fishers operating in other parts of the dam or during night time. Further empirical research, particularly interviews with a greater number of local subsistence and commercial fishers, might be required to build upon foundational work by Rouhani (2004) and findings by this study's appraisal. The multiplicity and overlaps between institutional jurisdictions, property rights and interests in Roodekopjes Dam fishery also points to a need to clarify access rights to and governance responsibilities over the fishery.

13.7 References and Bibliography

Community Survey 2007(2008). Statistical Release Basic Results Municipalities. Statistics South Africa. Pretoria: Statistics South Africa.

Leibold, M & Van Zyl, C. J. 2008. The Economic Impact of Sport & Recreational Angling in the Republic of South Africa, 2007. Report of a project to scientifically determine the overall Economic Impact and Strategic Value of Sport & Recreational Angling in the Republic of South Africa, 31 May.

Madibeng Municipality Draft Annual Report 2005/2006 Retrived on 18 July 2011 from ***http://mfma.treasury.gov.za/Documents/06.%20Annual%20Reports/2005-06/02.%20Local%20Municipalities/NW372%20Madibeng/NW372%20Madibeng%20Annual%20Report%202005-06.pdf***

Rouhani ,Q. (2004). *A report on the survey of selected large dams in the North West Province: with a view to develop fisheries*. Report for the Department of Agriculture Conservation and Environment, North West Province, South Africa.

Van der Walt , J.J., van der Walt,C.J. and AD Ceronio, A.D.(2004). Playing catch-up with catchment water quality the Vaalkop water treatment plant upgrade case study. Retrieved from ***http://www.ewisa.co.za/literature/files/134%20van%20der%20Walt.pdf***

Venter, B (2011). Letter from the Adv Bernard Venter, Secretary of the NGALAA, 11 August 2011.

http://www.bassfishing.co.za/north-west/roodekopjes-dam/

14 DEBE NEK DAM, EASTERN CAPE PROVINCE

14.1 Introduction

Field research was undertaken on the 13th and 14th of May 2011. The researcher was Vimbai Rachel Jenjezwa, assisted by Mr Eric Qonya from the Eastern Cape Province Department of Economic Affairs, Environment and Tourism (DEAET). In order to prepare for community entry, Mr Qonya spoke to leaders in the community and informed them about the researcher's visit. He explained the purpose of the visit and how the information that they provided would help the community.

Figure 51 Foundation plaque at Debe Nek dam

14.2 Methodology

Research method included focus group discussions, interviews and field observation. Focus group discussions were held with lead members of Mxumbu and Qanda village management committees. The researcher visited the Middledrift office of Department of Rural Development and Agrarian Reform (DRDAR) and also interviewed a ward committee member. No fishers were interviewed because community members said that they did not fish anymore. The researcher complied with ethical guidelines for social research by explaining the purpose of the research and assuring the participants that the information they supplied would not be used for anything other than the purposes of research on inland fisheries. Participants were also informed that they were free not to divulge any information that they were not comfortable with providing. Prior to meeting with the fishers, Mr Eric Qonya visited the respondents and informed them of the researcher's planned visit to the area the following day.

Problems encountered when undertaking fieldwork included the unavailability of the ward councillors. However, the researcher managed to interview a member of the Ward 18 committee, who was well-informed about the fishery development plans for the area. Another problem was that the locally-based agricultural technician did not have much information on the rural area around Debe Nek Dam.

14.3 Background to the Study Area

14.3.1 Location

Debe Nek dam is located in the Nkonkobe Local Municipality which falls under the Amathole District Municipality of the Eastern Cape Province. The towns nearest to the dam are Middledrift and Dimbaza. The dam is surrounded by Mxumbu, Newton, Matyolweni, Qanda and Qgadushe villages. Qanda and Mxumbu are the villages closest to the dam. Debe Nek Dam is located in Ward 18[65]. The nearest main road is the R63 which links Dimbaza and Middledrift. The main land use types around the dam are settlement, grazing and agriculture (crop and vegetable farming)[66].

14.3.2 Socioeconomic Profile

Nkonkobe Local Municipality has 21 wards and an average population density of 43 persons per square kilometre. According to Global Insight, in 2008, Nkonkobe Local Municipality had an estimated total population of 131 071 and 28 259 households. The majority of the population (72%) resided in both villages and farms and 28% resided in urban settlements. Urbanisation is mainly concentrated in Fort Beaufort and Alice. Africans are the majority in Nkonkobe Local Municipality at 94%. The coloured community constitutes

[65] Source: ***http://www.nkonkobe.co.za/clrallocs.html***
[66] Source: ***http://web.ndmc.gov.za/Maps/M%20Maps/BaseMap/Nkonkobe_%20%20A4_LS.pdf***

4.5%, whites 0.8% and Indians 0.1% of the population. The largest age group is the 0-39 age group. Women make up 60% of the population in the municipality. The population seems to have been decreasing since 1996. Between 2002 and 2008, the population decreased by about 1400, and this trend was mainly attributed to the HIV/AIDS pandemic, but this might be just one of the reasons. The Community and Social Services sector is the greatest employer in the Nkonkobe Local Municipality, employing 44% of the active work force. It is followed by agriculture (13%) and private households (this includes domestic work, home industries and businesses) (11%). The economy's dependence on state services is of concern.

14.4 History and Management of the Inland Fishery

Debe Nek Dam was designed and constructed by the former Ciskei Department of Agriculture and Forestry's engineering branch. The dam was built along the Debe River for municipal and industrial use and was owned by the Department of Water Affairs (dam number R102-01). According to the Debe Dam Rural Fisheries Project Proposal, the aim of the construction of this dam was for a regional water supply scheme to the rural villages in the South Eastern Middledrift to supplement/reduce pressure of water supply from Sandile dam. Around 1996, the dam was handed over to the management of Amathole regional water. In mid-1987 a company by the name Clifton Hatcheries/Fishing for Africa applied to the former Ciskei Nature Conservation Division to stock some selected dams in the Ciskei (like Debe, Laing and Kat river dams) with two species of mullet fish. The species were freshwater mullet (*Myxus capensis*) and flathead mullet or striped mullet (*Mugil cephalus).* The Debe Nek dam proved to be the most successful dam of all the dams that were stocked with this fish. The dam was new so it had only two indigenous fish species that were naturally occurring in the dam. The indigenous fish species were moggel/mud fish (*Labeo umbratus*), and the African mottled eel (freshwater eels, scientific name: *Anguilla Bengalensis Labiata*).

Debe Nek Dam was one of the most highly productive dams in the Amathole region and of the Eastern Cape Province at large in terms of its fish resource. This is due to the dam's altitude or geomorphological situation, and the fact that the dam is still new and rich nutrients drained into the dam from the surrounding catchment area and absence of predacious and invasive fish species. The fertility (high presence of organic nutrients, indicated by the presence of aquatic invertebrates like damsel fly, May fly and other biological taxonomy) of the dam, favoured the dam to be highly productive.

The Fishing for Africa project was successful and the fish that was harvested from the Debe Nek Dam between 1997 and 2000 was of high quality and was being exported in tonnes to the overseas market. The regional Department of Environment and Tourism office as the authorising government entity oversaw this project. A concession permit was given by the then DEAT office to a company called Fishing for Africa with the conditions to harvest the targeted fish under the supervision and presence of a nature conservation officer by the name Eric Qonya. The permit concession had the following conditions in it:

- Catch only the fish you stocked
- Employ the local people to assist in harvesting and packaging
- In the process of harvesting, build capacity by training; mentoring thereby imparting skills to the local young people to be able do the harvesting themselves, so that in the near future community is able to drive the project by themselves.
- Untargeted fish should be given to the locals for consumption and possibly the locals to sell some of the untargeted fish to generate their local trust fund
- A royalty or a certain percentage of the total yield should be paid to the community and be deposited in the communal trust fund

The project was in the past providing job opportunities to both communities surrounding the dam (Qanda and Mxumbu). A community trust was formed for the management of the turnover, targeted fish (both fish species of freshwater mullet) for export was harvested, shipped down to Cape Town, from there shipped to overseas countries, other untargeted fish produce was made available to the locals at a very reasonable price and spin-offs from the sales were also deposited to the community trust fund /account, this project also contributed to the food security for the two community at a substantial level/percentage as well as

poverty reduction as jobs were also provided; people trained on fish harvesting skills and processing of fish produce up to the level of export, wherein mobile blast freezers were used to transport fish. The project discontinued because of insufficient communication protocols and proper harmonising of relations between the concerned two communities which are Qanda and Mxumbu. Several meetings have been held with local leadership inclusive of the local councillor levelling the playing field to ensure that the project is revamped as some outside people wish to do a business venture with the community regarding fish utilisation of the dam and other integrated project along the dam.

The dam is presently used by Amathole Water Board to purify & supply drinking water to the downstream communities/ villages. The dam has mainly been generating livelihoods through fish production, but is now lying inaction, as the result of not enough communication protocols and engagement in the level of all concerned and interested parties at the inception of the project around the dam and was influenced by the politics of the time, which this resulted in the company that kick started the project to just desert/ abandon the operations, without having done any in routes into capacitating the targeted users of the dam, in terms of imparting enough skills. Two communities are the directly/immediate beneficiary to the dam, but also other surrounding communities/ villages have an indirect benefit from the spinoffs of the dam.

An on-going project that was funded by the national DEA looks at the production of tomatoes and supplies the regional market. Produce is sold in Middledrift, Alice, King Williams Town. The integrated project proposal states that the fisheries project should be revived and be a driving factor to the project. There should be encouragement of partnerships in business ventures regarding fish production. Other ventures include eco-tourism projects like environmental clubs to benefit school groups and other social groupings as there are a lot of both endemic and migratory fowls and other fauna & flora in and around the dam. Tourism related activities including camping or picnic sites (by building bungalows along the dam for aesthetic purposes), boat riding, recreational and sport fishing could be undertaken around the dam.

The interested parties in this project are:

- Research organisations, principally the Water Research Commission (WRC) and also collaborating organisations for the WRC national baseline and scoping study on the development of inland fisheries. These organisations are African Centre for Water Research (ACWR), Rhodes University (Department
  of Ichthyology and Fisheries Science), SAIAB and University of the Western Cape (PLAAS). Debe Nek Dam is a selected case study for the Eastern Cape.
- Provincial DEDEA- to Assist in the environmental impact assessment to the area and engage in authorising, the stocking and restocking of the dam with the suitable environmental friendly fish also to assist in putting up sign posts as to the specific fishing regulation and fishing spots as well as sign post to the entrance gate. The LED section of economic development to draw in some small grants regarding project design and assist in logistics that relates to project registering, and mobilizing the communities affected and drafting of the project constitution.
- Eastern Cape Development Cooperation (ECDC)- to assist with project design and funding models
- National DEA –funded the present project that is running (agrarian tomato project – for food security)
- DWA – to monitor and harmonise water related parameters
- Amathole Water Board- seeing that the immediate two communities Mxumbu and Qanda locations does not have the direct benefit from the dam, in the form of irrigation (as this benefit was denied to them by the then authority) or were not getting any royalty for the usage of their water resource, as their pastoral and cultivation land was taken over from them for this new land use activity, should make in some donations as to the bungalows and designing of camping sites along the certain sections of the dam, and other possible assistance.
- DRDAR – to do some soil testing of the surrounding area and possibly donate some fencing material to fence off certain section/areas of the dam for agricultural related project.
- Nkonkobe Local Municipality – assisting in drawing up of a business plan, to steer and driving the project, also assist in the funding of the project, draw in some outside funders, monitor and evaluating the project.

- Local leadership of all the affected and interested structures such as SANCO; traditional leadership; councilors; ward committees and development forums of the affected areas to participate in the project design.

The present challenges to the proposed project are:

- The dipping tank near the dam. Its discharge or spillage could be affecting the surface and the ground water and consequently the quality of fish and other related products of the dam if not managed properly.
- There are tonnes of fish already in the dam, ready for harvesting but presently no capacity or skills by the communities as to the harvesting techniques of fish, but are relying on the outside interventions.
- There is a lot of poaching of fish presently taking place at the dam by outsiders, taking lots of fish and communities are not organised and/or mobilised to control such illegal activities. Poachers are using illegal fishing gear like gill nets and to fish in the dam and such activities are happening during the late evenings of the weekends.

The foregoing account of the history and management of Debe Nek seems to indicate that the dam has potential for providing income through various means including fishing.

14.5 Characterization of Indigenous Knowledge and Current Fishing Practices and Techniques

14.5.1 Findings from Key Stakeholder Organisations

The institutional actors interviewed were Mr Qonya (DEAET) and Ms. Nomvisiso Mzanya (DRDAR). Most of the information that Mr Qonya provided was about the history of the inland fishery which is outlined above. Ms. Mzanya is the Agricultural Technician who visits communities around the dam. She has heard rumours that there are outsiders who go and poach fish from the dam. The poachers do not want to be seen because they have no agreement with the community members. There has been no investigation by DEDET into poachers so they do not know much about them. The dam belongs to the Department of Water Affairs. Debe Nek dam was built to reduce pressure on the Sandile dam. When Amatola was established around 1996, two men from East London and Durban came to discuss starting a business at the dam. She thought of getting people together for fishing but felt she needed to educate herself about fish and fishing before she approached the community. The community asked to fence the dam but they are yet to send a formal request which is necessary in order for the request to be addressed by DRDAR

Figure 52 Debe Nek: Litter of fish scales found by local residents

14.5.2 Findings from Rapid Appraisals of Fishers nd Local Key Respondents

Mxumbu Management Committee

The researcher conducted an interview with 6 members of the Mxumbu Management Committee. The committee is made up of 10 members and deals with development and all other community issues. None of the members were employed. The respondents said that the dam was built to supply drinking water to surrounding villages and for irrigation purposes. One on-going irrigation project, promotes the production of tomatoes for markets in Middledrift, Alice and King Williams' Town (Figure 53). People visit the dam for recreational purposes such as fishing and do not use boats at present. Mxumbu village gets its water from Sandile dam. Debe Nek Dam was built in the early 1980s to supply water to villages and for irrigation. Irrigation was later discouraged. The community was not involved in the building of the dam and the community was consulted. There were some mielie fields that were there around the river as well as rangelands.

People do not fish in the dam but used to do so when it was a river but fear of drowning. The people used to fish and swim in the river. There is superstition and traditional beliefs about mythical people who live inside the dam. They say that they only eat seawater fish but did not know that there was such fish in the dam. The people do not know how to fish in the dam even though they would have loved to utilise the resource. The community asked for the dam to be fenced. There has been talk about fishing but no response from the municipality. They talked to the people in Qanda to try and decide on where project should be based. The people in Qanda said their village is more accessible to the main road.

Figure 53 Debe Nek: Technola Zimkita tomato project along shoreline on Mxumbu side

The people want jobs and to benefit from fish selling through shareholding as suggested by Mr Qonya. Qanda would also benefit the same as Mxumbu. The two could collaborate and sell to other villages and in town such as in King William's Town. They would like to control access to the dam and charge people for entry/access and decide on a fee. At present, there is no controlled access and they would like to organise a ranger with Qanda to control fishing. There are two entry points to the dam, from King Williams Town and Qanda, so there is need for control points. The members said that their cattle drink water from the dam.

Qanda Ward Management Committee

In Qanda, the researcher two local male pensioners. Both men were members of Qanda Ward Management Committee. The men said that a white person put fish in the dam and since he left there had not been a project because the locals do not have boats. The white man left a boat and said his workers could continue using it. In the mid-1980s, community members wanted to start an irrigation scheme but were told by the Department of Agriculture that the dam was for water provision only. The tomato project currently being run has been in existence for about 5 years but is a Mxumbu village project. They were told preparations would be made to start a scheme but it did not reach fruition. They even called the DRDAR people but nothing happened.

People from King Williams Town and Dimbaza came and fished and when asked about their activities, they say that they have licences. The people usually went the dam during weekends and caught a lot of fish using cast nets and rods. Community members normally observed them from a distance. Illegal angling also took place in the dam. This had been going on for almost a year but had been affected by drought. Once a month, Mr Qonya said he went around the dam checking for poachers and signs of poaching. The Eastern Cape Provincial Department of Rural Development and Agrarian Reform officials told people to buy a fence to control access and members of Qanda community responded that they could not afford to do so. Hence DRDAR promised to try and assist the community. Qanda community members would like to fence off specific sections, with designated access points, sign posts and rangers to monitor the dam area. Qonya suggested that Qanda community could also consider day visits, a picnic spot and/or braai area and a camping spot. A boat landing area would also need to be built.

The respondents replied that ideas similar to Qonya's suggestions had been discussed in the past but nothing happened. Members of Qanda community had been told not to fish from the time when Fishing for Africa operated on the dam. The community did not have the resources such as boats and nets for the livelihood of the community and they did not have a fishing background. They did not have a problem with the company. The core person trained local people to use the fishing gear and tackle but the youth have no interest and the boat is not being used. The person who used the boat damaged it and stripped it. The individual continued with the fishing project after the departure of Fishing for Africa but for self-benefit. Although the individual was said to have nets and a boat, this was not to the knowledge of the community and its leadership (i.e. this was just a rumour, since the local community and leadership had never been

formally informed of this). These fishing resources were supposed to belong to the entire ward and thus beneficiaries were not limited to village communities immediately adjacent to the dam. Both respondents conceded that ecotourism would be helpful to the community.

Stakeholders of Debe Nek Dam were identified as including Amatola Water Board, Mxumbu village community, Qanda village community, DEAET and DRDAR. Qanda gets its water from Sundays River. Community members had heard about the envisaged fishery development project but had no further details since councillors made decisions alone. They had already asked the councillor to come and discuss the new project and their interests regarding it. The rationale was that local development issues, according to established protocol, could only be put across to the municipality via the councillor. Respondents emphasized that there were still unresolved issues that date back to the time of dam construction. For example, their fields were taken but they were not remunerated when the dam was built. They asked for direction (i.e. advice) on how to go about putting forward their concerns and ideas in order to obtain in desired responses since they so far encountered 'roadblocks' (i.e. been unsuccessful).

Key Resource Person: Ward 18 Committee Member

The researcher interviewed a ward committee member for Ward 18 and a member of the community policing forum. She works in conjunction with the councillor (who is the chairperson) and municipality. The ward committee has been in existence since 2008. There are ten (10) members in the ward committee, excluding the ward councillor. 'Trust Number 2' section, within which Debe Nek Dam is located, is made up of Nqaba, Qawukeni, Thorn Park and Middledrift. There had been no fishing since around 2005/2006. People used to catch and sell fish but not anymore. The people who currently fished were illegal fishers and were coloured people from King Williams Town, Dimbaza and East London. She had once reported the illegal fishers to police and when police came they found a boat but the fishers had gone. Illegal fishers enter the dam area from Mxumbu. Members of Mxumbu community had asked the councillor and municipality to erect a perimeter fence and put up a sign board saying fishing is illegal. The fishers use nets and hooks as well as hand lines with boats. The community wants to fish but they were told not to do so because it would be illegal. Some children catch fish after it rains on the shores of the dam.

Regarding the proposed Debe Nek fishery development project, the people who mooted the proposal were from East London and they came about 2 to 3 years back (i.e. 2008 to 2009). They wanted to fish in the dam and would employ local people and sell the fish overseas. The fish species they sought was mullet. The businessmen would continue from what the previous operator had been doing. The respondent personally thought that the proposal was a good idea because locals would get employed. If the proposal succeeds, she would also like shareholding capacity, as suggested by Mr Qonya, and a building to train people to run the project themselves. Both Mxumbu and Qanda would benefit from the project. Most people do not work and those that do have moved to other cities. Recently per village, 2 jobs arose for fixing the road and cleaning the cemetery. The contract is for about 2 to 3 months with the municipality. Such employees earn R70 a day. People in the villages depend both on the household member who works (i.e. formally employed), normally teachers, and those that take care of the house or livestock. Local people do not pay school fees and uniforms are provided by the Department of Social Development. Levels of poverty and unemployment are high, and the latter affects all age groups of the local labour force. Most houses are made of wood, bricks and steel sheets. Most people grow vegetables and crops in their backyards. The households have yard taps that the people installed themselves.

The respondent stated that there had recently been an incident of serious crime, which is rape. Petty crimes are more common. If there is an incident of crime, they call the police. In terms of the rape case, they called the police and the person was caught. There is also stock theft and theft of clothes, mostly by people from Dimbaza, but there were no longer so common. Local communities in Ward 18 had told DRDAR officials in Bisho and Middledrift that they wanted to start an irrigation scheme and showed them the place, but nothing had been done. There is a lack of consistency, no vibrant committee, high staff turn-over and officials who do not share people's values, objectives, hopes and enthusiasm. Hence, officials come and go, while members of committees change every two years. There has therefore been no follow up on the fishery project proposal, and the then chairperson has since passed away. He was very active.

14.6 Discussion and Conclusion

Based on Debe Nek Dam's high potential for producing high quality fish, this dam could be used as a very productive inland fishery. Outsiders including fishing companies are interested in starting projects at the dam. Members of local communities are also interested but do not know how to fish. Despite this, they sense that they have a preferential right of access to this common pool resource over outsiders. There needs to be a follow up on the parties interested in fishing in the dam for business purposes. Although there is a tomato project, the dam could also be used for other purposes. The absence of fishing practices by the surrounding communities is an indication of under-utilisation of the resource. The locals have not been able to start a fishing project mainly due to tensions between the two closest villages of Mxumbu and Qanda. The communities need to unite and work together to put in place plans to protect their resource. Other resource protection measures include erecting fences to control access and training community members on fishing practices and techniques. This will help build the capacity necessary to empower the community to start up and run a fishery project. Unemployment and poverty are high in the area, which contributes to high levels of crime and migration of people (mainly youth) to nearby towns and cities. The proposed fishing project thus presents a potential solution to some of the socio-economic challenges facing rural communities around Debe Nek Dam.

In conclusion, communities could work together with interested institutional actors, such as Mr Qonya, who is well informed about the legislation, species and fishing practices. The official also has contact details of people who might be willing to assist or work together with communities in order to develop a fishery. Communities also need to liaise with other stakeholder organisations, such as DRDAR, especially in connection with the dipping tank located next to the dam. The dipping tank may affect water quality and fish health, thereby compromising the project. More research is needed to determine the impact of the dipping tank and tomato farm on the fishery at Debe Nek Dam.

14.7 References and Bibliography

http://www.nkonkobe.co.za/nkonkobeidp20102011.pdf Accessed on 26 May 2011

http://www.nkonkobe.co.za/clrallocs.html Accessed on 26 May 2011

http://www.watersupport.co.za/misc/MunicipalInformation/eWISAWaterworks/misc/MunicipalDocuments/ECDisAmathole/LMNkonkobe/nkonkobe%20-budget%202007-2012.pdf Accessed on 26 May 2011

Nkonkobe Municipality Spatial Development Framework, November 2004. Accessed on 4 June 2011 from ***http://drupal6dev15.econsultant.co.za/sites/drupal6dev15.econsultant.co.za/files/Nkonkobe%20LM%20SDF_Nov04.pd***

15 DIAGNOSTIC SUMMARY AND CONCLUSIONS

Patterns of South African inland fisheries governance, use and management are determined by varied, overlapping and unclear formal and informal institutional arrangements or lack thereof. Due to the inherent traditional institution of local community access to common pool resources, members of local communities generally perceive local subsistence fishers to have a legitimate claim to fish, despite that conservation agencies often regard their activities as illegal since they largely fell outside the ambit of past and/or existing regulations. Lack of clarity on institutional arrangements for access often leads to conflicts between formal and informal fishers in many dams.

This section summarizes the identified issues pertaining to inland fisheries resource utilization and governance.

15.1 Overview of Resource Utilization Issues

Surveys conducted on a cross-section of diverse rural contexts reveal that there is a prevalence of formal and informal subsistence (77%), recreational (69%) and commercial fishing (40%) activities on the dams, lakes and floodplains surveyed.

Indigenous fishing knowledge and practices are barely discernible or absent in the majority of communities. There are very few cases in which rural communities show evidence of long-standing fishing traditions, which are either actively used or passively retained in memory and artifacts. In such cases, traditional and indigenous knowledge and practices coexist with newer practices and techniques, and are continually being adapted to newer circumstances and fishery ecosystem conditions. Taboos, cultural beliefs and mysticism relating to access, use and safeguarding of inland fisheries resources and ecosystems abound in some of the observed communities.

The survey findings also suggest that in most cases, current subsistence, recreational and commercial fishing practices and techniques are relatively recent developments that have been influenced by combinations of exogenous factors, such as the development of water storage dams, interactions with outsider recreational anglers and commercially-orientated fishers and pervasive poverty and unemployment. However, evidence of scant remnants of indigenous fishing terminology and techniques and coexistence of traditional and newer practices and techniques in some of the cases hints at the possibility that such communities might historically have actively fished from rivers, lakes, wetlands and floodplain pans and, at some point in time, discontinued fishing and eventually lost much of their fishing knowledge. The Makuleke case, for example, clearly attests to such possibility. Despite that the disruption of Makuleke people's traditional fishing activities though displacement and resettlement is relatively recent (+/-32 years), this case indicates that past alienation of fisheries and related ecosystem resources might have had erosive effects on pre-existing stocks of indigenous fishing knowledge. Further in-depth research is required to document oral history and testimony regarding rural communities' relationships with inland fisheries.

Key issues relate to fishing practices and techniques range from those that impact on the resource; demand or availability of the resource; mobilization of the resource; risks and harmful effect of the resource; contestations over shared access; crime; and sustainability of inland fishery ecosystems, ecosystem services and livelihoods. The list below highlights some of the identified issues.

- Contestation and litigation regarding shared access (Pongola Dam)
- Increased fishing in sacred sites (L. Fundudzi)
- Demands for equitable access to inland fisheries (e.g. Flag Boshielo)
- Decimation of fish populations and migration to fisheries elsewhere (e.g. Nandoni)
- Influx of other fishers (e.g. Makuleke has influx from Nandoni)
- Competition with fishers from neighbouring countries (e.g. Masibekela)

- Increase in and criminalization of subsistence fishers; transboundary dam management context (e.g. Driekoppies)
- Threat of land use changes to sustainability of ecosystem services (e.g. Pongola Floodplain)
- Heavy metal pollution (e.g. Zeekoevlei)
- Contamination by raw sewage (e.g. Zeekoevlei)
- Fish deaths (e.g. Middle Letaba)
- Poor catch-and-release techniques
- Littering
- Garbage disposal
- Agricultural pollutants (e.g. pesticides)
- Crime: fisher insecurity and vulnerability
- Wild animals (hippos and crocodiles)
- Danger of drowning
- “Disappearances” of fishers (Pongola Dam)
- Need for external support for rural people’s small-scale commercial enterprises

15.2 Overview of Governance Issues

With over 3000 storage dams water bodies located near rural communities, South Africa has great potential and opportunity for the development and enhancement of a livelihoods based inland fisheries. Although the storage dams were primarily constructed for the provision of water for domestic, industrial and irrigation purposes, they are utilised for recreational angling, other types of fishing, tourism, water sports, etc. Apart from these established secondary uses, they hold potential for development and enhanced use for fishing based livelihoods. Such a sector could be an important source of protein especially for the food insecure rural communities. In addition, the dams also provide opportunity for inclusion of communities in the recreational angling and tourism value chains where such activities occur.

15.2.1 Lack of a Clear Policy Framework

The lack of a national policy has historically been and remains a major bottleneck in the development of inland fisheries.

The existence of multiple responsible authorities and stakeholders, who often have competing agendas and overlapping interests, compounds issues around the utilization of many inland dams with the result that the economic potential of these water bodies is largely unknown and often grossly under-utilized. There is a lack of connection between formal and informal resource governance and management organisations, which represents an enduring legacy of protectionist approaches to fisheries resources management.

15.2.2 Inland Fisheries and Access Rights Regimes

Some dams exist under more than one property rights regime for various reasons. For example, while the Nandoni and Makuleke dams legally belong to the DWA, the lack of an active fishery management presence by the provincial environmental agencies has meant that the local chiefs are exercising proprietary rights (control access, withdrawal, management and exclusion rights), especially for fishing. At the same time the DWA have ownership rights (i.e. authority to govern access, withdrawal, management, exclusion and alienation rights). In this context such dams exists under dual property rights regimes – both public and communal. While public dams often retain the original use that they were constructed for (i.e. as storage dams for domestic, industrial and irrigation water), most have found wider uses. Such multiple uses include as utilization as sites for water sports, tourism, recreational fishing, as part of game reserves, and, increasingly for subsistence and artisanal fishery livelihood purposes.

15.2.3 Inland Fisheries as Common Pool Resources within Rural Communities: Prospects for Traditional Leadership Roles and Legal Pluralism

Water bodies adjacent to communal land, such as Lake Fundudzi, could be classified under a 'communal property regime'. Communal areas are governed by Traditional Authorities who derive their powers from the Traditional Leadership and Governance Framework (TLGF) Amendment Act (Act 14 of 2003). In such contexts, Traditional Authorities can exercise ownership rights (i.e. authority to control access, withdrawal, management, exclusion and alienation rights) on behalf of their subjects, as Chief Netshiavha, *Induna* Mazibuse Nkalanga and Makuleke Tribal Authority and CPA do on behalf of their subjects, respectively, with regard to Lake Fundudzi, Masibekela Dam and Makuleke Dam. Although corrupt or unaccountable chiefs have been known to sell (alienate) communal resources, this is not normal practice.

Given that the legitimacy of traditional leadership may be in question in some areas, governance questions that need to be answered include:

- Whether or not the equity principle can best be served through traditional governance institutions;
- What are the benefits and constraints of creating an institutional environment for a legally pluralistic system of inland fisheries governance in South Africa;

By raising these questions, this report should not detract from the importance of the need to ensure the sound governance of inland fisheries. Indeed, in contexts such as this, where there is virtually a vacuum in terms of *de jure* governance arrangements, local pro-activeness and innovation should be constructively supported. The national constitution and other statutes make provision for legal pluralism, which means that the formulation of local institutional arrangements needs to take traditional leadership into account.

Given the diverse informal and informal institutional governance arrangements present in each rural community, the local fishery governance arrangements will need to be negotiated for each situation with resource users and stakeholders based on 'good governance' and co-management principles.

15.2.4 Issues of Shared Access

The rapid dam survey found that user conflicts were only reported at 18% of sites visited. Problems over shared access to recreational fisheries seem to be more pronounced in some dams, such as Phongola, Driekoppies and Roodekopjes, than in others, such as Flag Boshielo, Nandoni, Middle Letaba and Lake Zeekoevlei. In yet other cases, such as Voëlvlei Dam tensions over inequitable access to the shared fishery between HDIs and established recreational and commercial sectors remain low-key. However, such tensions require timeous and robust responses and effective implementation of governance reforms.

It seems that tensions over inequitable access develop when local subsistence, recreational and artisanal fishers perceive themselves to be resource poor and marginalized relative to outsider recreational anglers and commercially-orientated fishers, who own better fishing gear, have fishing licenses and/or have better fishing skills, end up exploiting a larger and/or more secure share of local fisheries resources. In a number of cases, such as Makuleke, Flag Boshielo and Masibekela, local fishers' perceptions of inequitable access rights have led to rising calls for more stringent control over access to such resources and mechanisms to secure greater benefits to local fishers and their communities. Such calls are also accompanied by concerns about over-fishing and possible threats to the sustainability of fisheries resources and local livelihoods. Underlying these perceptions of preferential local community resource access entitlement is a deeply held sense of common pool resource rights. An inland fishery policy should thus make legal provision for recognition of common pool and traditional rights.

The case of emergent artisanal recreational fishers on Pongola Dam in KwaZulu-Natal provides an example of the problem of contestation between established formal recreational fishing, tourism and conservation sectors, on the one hand, and emerging artisanal and recreational fishers over shared access rights to an inland fishery. This particular case raises issues about the disjuncture between allocation and realization of resource rights in post-Apartheid South Africa's transformation process. In contrast to unorganized

and unregistered recreational fishers in South African rural communities around Flag Boshielo, Nandoni, Makuleke and Masibekela Dams, artisanal fishers on Pongola Dam have acquired fishing and skippers' licenses and organized themselves into a coherent formal structure, which is Sizabantu WUA. Their formalization process is still ongoing. Despite a multi-stakeholder process to actively include these fishers in formal recreational fishing on the dam, established eco-tourism operators on the dam have actively resisted such moves. There is a need for further research on the case of artisanal and emergent recreational fishers on Pongola Dam, given the paucity of literature on recreational fishing in South African rural communities.

The similarity of interests in fishing by recreational fisheries from different privileged and disadvantaged backgrounds stands in stark contrast to the ongoing conflicts over access by emergent black artisanal and recreational fishers to Phongolo Dam fisheries. Such similarity strongly attests to the sameness of humanity, irrespective of colour or creed, and therefore the redundance of racially-based exclusionary tendencies within South African recreational fisheries. As in the case of Gariep Dam, the coexistence of recreational and artisanal fishers on Phongolo Dam presents opportunities for constructive interactions, such as co-management of fisheries and more equitable benefit sharing arrangements.

15.2.5 Operational Challenges

At an operational level, while most of the existing water storage dams seem to have considerable potential for the development of inland fisheries, such fisheries remain poorly developed despite several attempts since the 1970s to develop subsistence and commercial fisheries (see Volume 1, Chapter 2). This is partly due to that inland fisheries have never been defined as an economic sector in policy.

Dam development objectives have also historically focussed on provision of water for agricultural, industrial and domestic use, to the exclusion of inland fisheries use. The reasons cited for the lack of inland fisheries development in community settings variously include;- a scarcity of natural water bodies where a culture of fishing might have developed, a lack of historical involvement in fishing, cultural resistance to fishing, lack of access to fishing gear and lack of knowledge of the potential of the resource (Volume 1, Chapter 2).

While the growing awareness and government policy shifts signify that the prospects for sustainable inland fisheries development and possible opportunities to enhance rural livelihoods have improved, institutional changes will be required particularly at the operational level if the implementation of governance and management interventions is to achieve desired objectives. In particular public sector operational capacity needs will need to be addressed to facilitate the required developmental interventions.

15.2.6 Challenges of Insufficient Knowledge

An issue that is directly linked to the aforementioned issues, is that there is a paucity of published information on inland fisheries, particularly in rural community contexts. Effectively, subsistence, recreational and commercial fishing practices and techniques within such communities are not well known because limited studies have been carried out on them. Moreover, South African inland fisheries have generally been considered to be poorly developed compared to those of other parts of the world (Volume 1, Chapter 2). Since inland fisheries have occupied a 'blind-spot' in both policy and dam development, research on these resources has never been well funded in South Africa. Most studies that were undertaken on the fisheries potential of impoundments date back to the 1980s, which marked the period just after some of the largest impoundments were constructed, stimulating a brief interest in developing inland fisheries (Volume 1, Chapter 2). These studies however focussed largely on biological productivity, and not on aspects of governance or social and economic benefit. The implementation of an inland fisheries policy based on comanagement at local community level thus requires a concomitant research and monitoring component focussing particularly on the 'human dimension' of fisheries.

15.3 Conclusion

The case studies confirm that a large portion of the rural population of South Africa is in some way directly dependent on natural resources for subsistence and many rural areas experience water-related problems and a lack of expertise to manage resources. Inland fisheries, in particular, are sites of convergence, contestation and conflict or cooperation among multiple 'stakeholders' with diverse interests, bundles of 'rights', multiple jurisdictions and power dynamics over the sharing of resources. The recent rise of informal commercially-orientated exploitation of inland fisheries, often by outsiders, has taken place against the background of a vacuum in terms of absence of policy, legislation and institutional arrangements. Without sound institutional frameworks, structures and networks to guide day-to-day operational governance and management of inland fisheries, contestations might increase, to the detriment of sustainability of such resources. The study findings therefore also confirm the argument by Weyl *et al.* (2007) for an inland fisheries policy for South Africa.

The policy and governance recommendations flowing from the case studies presented in this volume are synthesized into the Conclusions and Recommendations section of Volume 1 (Chapter 10).

APPENDIX 1. RAPID DAM SURVEY

Background

In order to supplement the in depth assessment of fishing activity on 12 dams undertaken by PLAAS-UWC, a rapid survey of an additional 38 dams was undertaken by Rhodes University's Rural Fisheries Programme. The project researchers were Mr Qurban Rouhani and James Kinghorn. This included some large dams as well a smaller number of dams in the Eastern Cape, Northern Cape, NW Province, Limpopo and Mpumalanga.

The survey generally found that fisheries in some were present all almost all dams. Most dams were used for subsistence and/ or recreational fishing. A number of instances of tension of conflicts between recreational and subsistence fishers were observed. For example, recreational fishers often took the law into their own hand and confiscated nets belong to subsistence fishers.

A synoptic profile of each dam surveyed is included below by province.

Eastern Cape Province

Pikoli Dam 33°11'26.45'S 26°57'52.66'E

Description

Pikoli Dam is an irrigation dam within the Tyefu Irrigation Scheme. There is a village living close to the dam (Pikoli village). The primary purpose of the dam used to be for irrigation, however for almost two decades the agricultural activities around the dam has ceased. The water in the dam is now used primarily to water the cattle. The area around the dam is denuded of vegetation and due to over grazing the top soil has been eroded. It is possible to dive up to the edge of the dam.

Fishery background

In 1997, The Rural Fisheries Programme (RFP) initiated a community fishing project on this dam. One fisher was trained and provided with a gill net and long lines to target moggel and catfish. The fisher used to fish the dam for moggel and for catfish in the Fish River, approximately 3 km from the dam. A boat was also provided – to deploy the gill net.

In the initial two years of the project the fisher (Mr Matoli) successfully fished the dam and would sell his catch by the N2 road side (approximately 10 km away). He would hire a donkey cart or get a ride with a taxi to take him and his fish in a cool box. In his second year he used to hire young men to fish for him and he would concentrate on selling his fish.

In his third year, he moved to East London as he was offered a job. In his absence, youth from the village have started to fish on the dam, using spears to target fish in the shallow waters. The youth fished on ad hoc basis and would eat the fish and occasionally fish.

In 20 11, when we visited the dam, Mr Matoli had moved back home and was keen to restart fishing. However, it would be a few years before Pikoli dam can be fished as in that year a large fish kill occurred probably due to a drop in the oxygen levels of the dams (due to the rains and nutrients being washed in the dam).

Overall, there is still a strong interest in fishing within the community, possibly as they had already seen the benefits of starting a fishing project

Mankazana Dam 33°09'50.06'S 26°57'12.50'E

Description

Mankazana Dam, situated in the Fish River Valley is part of the Tyefu irrigation scheme. The dam is no longer being used for irrigation purposes, but it is being used for drinking water and for cattle. There is a large village that lives around the dam, and the main road of the village passes over the dam wall. In times of drought, water from the dam is carted to nearby villages and settlements.

Fishery background

In 2011, the RFP on behalf of the District Municipality initiated a fishing project on this dam. Five men from the surrounding villages (nominated by their Chief – Chief Makinana) were trained to catch bass using rods and lures. It is perhaps important to point out that when this dam was visited in 2011,a fisher that the RFP had trained in a nearby village (Glenmore), was seen fishing on Mankazana dam, for food security and to sell excess catch.

The fishers were then fishing approximately two days a week on the dam, and used to eat and sell their catches. They found that there was considerable interest in their fish and it was not difficult to sell their catches. However, they often had to sell on credit as their customers had to wait until pension pay out days to pay them back.

An import issue that the fishers raised was the presence of recreational bass fishers who visit this dam, usually over the weekends. These recreational fishers, most of which are from Grahamstown, approximately 50 km away, often take the fish that they have caught (form boats) and do not pay for this resource. Another area of concern for the fishers is that they wanted access to bigger dams so that they could catch more fish to sell – however as they lived in a generally isolated area they were not sure how to achieve this.

Tyefu Dam 33°10'16.45'S 26°55'03.86'E

Description

Tyefu Dam is at the centre of the Tyefu irrigation scheme (Fish rive Valley) and is surrounded by the local village. The dam is easily accessible by two roads. Due to over grazing, the land around the dam is in poor condition. The water in the dam is no longer being used for irrigation, but it is used to water cattle.

Fishery Background

In 1997, Pikoli Dam was surveyed and a gill net fishery was developed. This dam was found to be productive and the main species of fish targeted was tilapia (though carp and moggel was regularly caught as well in the gill nets). The fishers were provided with a boat and which was kept in a nearby house.

Initially, the fishers caught well and they sold their fish locally – as there was demand for it. However, there were conflicts between the fishers and when the funding of the project ended in 1998 the fishing stopped. Also the fishers moved to various other towns to look for employment.

In 2011, the RPP was contracted by the local District Municipality to initiate a new project. Five fishers were trained and provided with gill nets and a fibre glass canoe to fish. A socio-economic survey showed that there was demand for fish locally. Options to sell fish included frying fish for the school kids (usually five Rands a piece). The fishermen were nominated by the local Chief and when the project funding at the end of 2011 the fishermen were still fishing.

Bass Dam 33°09'02.96'S 26°51'32.12'E

Description

Bass Dam is a small dam which is part of the Tyefu Irrigation scheme. The dam is set about 2km from the road in an isolated valley. There are no houses nearby, however, as this dam is used as a water point for the local cattle it is productive.

Fishery Background

In 1997, when the RFP developed a community based fishery in the Fish River, the project focused on community members who we had trained to catch catfish from the river using long lines. Catfish is not indigenous to the Fish River, their presence in the river is by way of the Orange – Fish River Tunnel.

The fisher on the project would catch catfish in the river, typically weighing about 8 – 10 kg and sell them locally. One of the fishers from the project, who lived about 2km from Bass dam, on his own initiative, would go to Bass dam on his own and catch bass.

The catch was consumed by his family and excess would be sold locally. This gave this particular fishermen an advantage to is fellow fishers as he was able to offer two different types of fish to his customers.

In 201, when we visited this dam, it was clear that no body was fishing on this dam as the track to the dam was completey overgrown and it was no longer possible to drive to the edge of the dam. It was not possible to track the fishermen who fished on this dam (Mr Njanji).

Lost Dam 33°09'33.73'S 26°59'17.71'E

Description

Lost Dam is again part of the Tyefu Irrigation scheme. It is situated between Mankazana and Pikoli Dam. The dam was constructed by building a wall between two steep hills, so access to this dam is limited to just one point. Currently the only purpose of the dam is to provide water for cattle.

Fishery background

In 1997 when this dam was surveyed by the RFP, the catches did not indicate that there were any fish in the dam. To enhance the fishery in the area, the RFP obtained a permit from the Eastern Cape Department of Environmental Affairs to stock it with moggel from Pikoli Dam.

In 2011, when the RFP was developing a fishery in the nearby dams, the biological survey showed that the dam had large numbers of bass in it and no moggel was recorded. It was then apparent that the recreational bass anglers had stocked this dam with bass – probably from Mankazana Dam. Also the local community has reported that this dam was now being visited by the recreational anglers.

Lost dam is now being fished by the community fishers who are based at Mankazana Dam. They visit this dam approximately once a week (as it is further away from them than Mankazana) an the fish that they catch is used for consumption and for local sale.

One of the issues raised by the fishers is that they feel that the recreational fishers who visit this dam as well as Mankazana Dam are taking their fish without any economic compensation to them. They are not happy about this but they are not sure how to address this and which authority they should take up with.

Nteyetnana Dam

Description

Nteyetnana Dam is set is a rural area, the closet town being Mount Ayliff. There is good road leading to the dam, and the area around the dam is sparsely populated. The water for the dam could be used to supply Mount Ayliff – however this was not verified.

Fishery Background

In 2003, the RFP surveyed this dam on behalf of the District municipality with a view to develop a recreational fishery (fly fishing for trout). The results of the survey showed that the feasibility of developing a recreational fishery for trout fly fishing was very limited as the dam was already stocked with carp and the possibility of obtaining a permit from the Department of Environmental Affairs to stock the dam with trout would have been low. Furthermore, Nteyetnana Dam is remote from other fly fishing dams in the Eastern Cape Province.

During the survey (in 2003), fishers from the local community were seen fishing at the dam and they were interviewed. They indicated that approximately 20 – 30 fishers fished at the dam. They used hand lines and fished for carp. For bait they used earthworms and bread. The fish they caught was for local consumption and did not sell their fish.

In 2011, when the dam was visited, a small group of fishers still fished at the dam, for subsistence. There catches over the years were consistent – indicating that there fishing was not pacing any pressure on the resource.

Mthatha Dam 31°32'13.17'S 28°44'10.22"S

Description

Mthatha Dam is situated on the outskirts of Mthatha town. There are a number of villages around the dam, and there are a number of roads that leads into the dam. The dam is used primarily as a source of water for the town. There is also a government fish farm / hatchery by the dam.

Fishery Background

In 2000, the RFP surveyed Mthatha Dam. Approximately six fishermen fished this dam but only occasionally (with hand lines). The fished for carp and the fish was for local consumption. From the interviews of the fishermen it was clear that the fishers only fished occasionally and it was not a regular activity – for which the depended on as an important source of food.

The biological survey indicated that this dam was not productive – hence the low interest in the community to fish this dam.

In 2011, when the RFP visited Mthatha dam, no fishers were found by the edge of the dam and it was difficult to establish if people still fished at the dam – though some people indicated that there were still people who fished this dam occasionally.

It is possible that due to the low productivity of this dam, that fishing on the dam has not been adopted by the community as an important livelihoods strategy for food security.

Dimbaza Dam 32°50'38.11'S 27°13'30.86"E

Description

Dimbaza Dam is situated within the town of Dimbaza. This town is approximately 20 km from King Williamstown, and was built as an industrial town within the Ciskei. The area around the dam is built up – mainly low cost houses and now disused industrial parks. It is possible to drive to this dam from a number of points.

It is speculated that when the dam was built with a view to supply water to the many industries in Dimbaza, however presently most of the industries in the industrial park have closed down. Dimbaza has high unemployment rates.

Fishery Background

In 2001, on behalf of the Provincial Government, the RFP initiated a fishing project in Dimbaza Dam. A group of five fishermen where trained and provided with a rowing boat and gill nets – to fish for moggel. The group had access to a freezer (funded by the project) and they would regularly sell their fish to the local public. The group was enterprising in that they also used to supply the local spaza shops and shebeens with fish. In the year that the project was involved with the project, two of the fishers left the group, but the remaining members continued to fish. Soon their services (to supply fish) became well known in the town and they generally used to sell all of their catches.

When the RFP visited this dam in 2011, it was not possible to trace the fishermen. A few years ago it was reported in the media that school children had drowned in the dam – therefore there could be a link between this incident and the difficult to trace the fishermen. It is possible that after the children drowned the fishermen could have moved on to find work not related to using the dam.

Cata Dam 32°37'33.67" S 27°07'06.45"E

Description

Cata Dam is situated within the Amathole mountains, approximately 30 km from the town of Keiskammahoek. The original purpose of the dam was to supply water to the farmers below the dam and to supply water to Kieskammahoek.

Access to the dam is limited, as the sides of the dam are steep, however there are sections of the dam that cattle can reach. There is a large village on the western bank of the dam

Fishery background
Between 2009 – 20011, the RFP was involved in a project to develop a recreational fishery on the Cata River. The fishery was to develop a trout (brown) flyfishing project from the point where the Cata river enters to the dam to the top of the river in the Amathole mountains.

Brown trout were stocked in the Cata river, over a hundred years ago and soon after that the Cata river became know as a river to catch these fish (for further details one can read *The Rapture of the River.*

A survey was conducted along the river and a community based fly fishing project was developed. The aim of the project was to attract fly fishers to visit the Cata river and to stay in the community owned chalets and to hire the fly fishing guides from the community – which were trained by the RFP. The project was successful in that fly fishers began to visit this area and it had favourable write ups in fly fishing magazines.

During this period there was no evidence of any fishing taking place on the dam or below it – by the community for subsistence purposes. There is a deep cultural perspective with regards to ancestors who live in the water in that area. For example, the river above the dam is used by the sangoma's for cultural / ritual purposes on a regular basis.

Mnyameni Dam 32°36'02.68"S 27°03'57.52"E
Description
Mnyameni Dam is situated within the Amathole mountains, approximately 20 km from the town of Keiskammahoek. The original purpose of the dam was to supply water to the farmers below the dam and to supply water to the village of Mnyameni (and six other villages in the area).

Access to the dam is limited, as the sides of the dam are steep, however there are sections of the dam that cattle can reach.

Fishery Background
Between 2009 – 20011, the RFP was involved in a project to develop a recreational fishery on the Mnyameni dam. The fishery was to develop a trout (rainbow) flyfishing project on the dam and in the river (Mnyameni river) leading into the dam.

Rainbow trout were stocked in the Mnyameni river, over a hundred years ago and soon after that the river (and then subsequently the dam) became know as a river to catch these fish (for further details one can read *The Rapture of the River.*

A survey was conducted along the dam and river and a community based fly fishing project was developed. The aim of the project was to attract fly fishers to visit the Mnyameni dam and to stay in the community owned chalets(in Cata which is approximately 10 km away) and to hire the fly fishing guides from the community – which were trained by the RFP. The project was successful in that fly fishers began to visit this area and it had favourable write ups in fly fishing magazines.

During this period on only one occasion a member of the local community was seen fishing on the dam for trout – for subsistence. It seemed that fishing on this dam by the community is seldom undertaken. There seemed to be strong cultural beliefs by the community that their ancestors lived in the water (dam).

Sandile Dam 32°42'43.31"S 27°06'23"E
Description
Sandile Dam is situated approximately 30 km from Kieskammahoek. The dam was built to supply an irrigation scheme. There is a village on one part of the dam. There are entry points to various sections of the dam.

Fishery background
In 2009, the RFP surveyed this dam (and the Wolf River that feeds into this dam). The objective of the survey was to determine if a fly fishing project could be established on the Wolf River.

The Dam is visited regularly by bass fishers from fishing clubs from East London and other surrounding towns – though it is a marginal dam for bass fishing as the dam is slightly turbid. The bass fishers are "day visitors" in that they come for the day and do not spend the night in the area.

During the survey, the RFP did not meet any fishers around the dam, however in 2011, when the RFP visited the Sandile Dam, 4- 5 fishermen were seen. They fished using hand lines and using earth worm as bait were targeting bass. The catch was for subsistence.

They fished occasionally and it was clear that fishing was not a particular important part of their daily activity.

Kat River Dam 32°34'35.15"S 26°46'12.03E
Description
Kat River Dam is situated on the edge of Seymour, a town in the former Ciskei. There are many entry points to the dam and a regional road crosses dam be means of a bridge. There are large numbers of unemployed people in the town.

Fishery background
In 1999, the RFP initiated a fishing project on this dam. Two groups of fishermen were organised, each group having 3-4 members. The fishers were provided with gill nets and long-lines to catch carp and catfish respectively. The fishers were also provided and trained to use small rowing boats.

Typically, the fishers would set their gear in the late afternoons and retrieve it early next morning. Before the fishing project was initiated, the community members did not catch fish – so for them this was a first. The fishers caught enough fish to consume and to sell locally. A freezer was provided to the fishers to assist them to keep the fish.

From the onset of the project , there issues between the fishers and this often resulted in accusations between the members on theft of gear or fish. This mistrust and friction resulted in that by the end of the year of the project, only one fisherman remained with the project (Mr Stanford).

In 2010, when the RFP visited Kat River Dam, this fisherman could not be found, however, approximately 5 other members of the community had started to fish – using hand lines. They fished for subsistence and would sell their catch if they caught extra.

Binfield Dam 32°41'43.60"E 26°54'40.33"E
Description
Binfield Dam is situated approximately 30 km from Alice. The dam has few entry points to it as in some sections it is surrounded by steep hills. There is a village on the south bank of the dam. The dam is used primarily for drinking water (for towns below the dam) and as a source of water for the local cattle.

Fishery background
In 2008, the RFP surveyed this dam, at the request of the local municipality to determine its fishery potential. Bass and blue gill sunfish were recorded in the dam (however there were reports that trout was also present). During the period of the survey, no local community were seen fishing at the dam and on inquire it was determined that they did not fish in the dam.

However, it emerged that this dam used to be popular with the bass recreational fishers (mostly from East London and Stutterhiem). In fact, at one stage this dam hosted a national bass fishing competition. But in recent years, the popularity of this dam amongst bass fishers had declined, not because of reduced

catches, but because of security concerns. There were increasing incidents of the vehicles and tents of the anglers being broken into when they were fishing. When the anglers were interviewed they indicated that if their security concerns were addressed they would return.

When the RFP visited this dam in 2010, a community member indicated that approximately 5 fishers fished on the dam – using hand lines for local consumption. It was not possible to meet the fishers as they were not present on that day.

Northwest Province

Disaneng Dam 25°50'31.09"S 25°20'11.89"E

Description

Disaneng Dam is situated approximately 40 km from Mafikeng. The dam is within tribal lands and there are villages close to the dam. Water from the dam feeds in to Setu Dam, which is the primary supply of water for Mafikeng – Mmabatho towns. There are a number of roads that lead to the edge of the dam. There is also a disused fish farm below the dam wall.

Fishery background

In 2003, the RFP initiated a community based fishing project on Disaneng Dam. A group of fishers (5) were trained and provided with equipment to fish for tilapia. The gear included gill nets and a canoe, to target the tilapia in the dam. The biological survey indicated a productive system in the dam. There was local demand for this fish, however due to limited institutional support, the project declined. The fish from the dam was used by the fishers for their needs and access fish was sold locally.

One of the early challenges that the project faced was that he electricity to fishing offices (where the fishers had their freezers) was cut off by Eskom due to previous arrears (which were incurred not by the fishers but by the Provincial Department of Agriculture). Without access to electricity, the fishers were unable to keep their fish fresh and reach larger markets in Mafikeng. Day time temperatures can easily reach in the 40's, therefore without electricity to keep the fish cool they spoil easily.

In 2011 when the RFP visited the dam, the fishing project had stopped. The fishermen had joined an aquaculture project (that failed to deliver). There were approximately five fishers from the community fishing with hand lines for subsistence.

Over weekend, this dam is visited by recreational anglers – approximately about 10 anglers per day.

Setumo Dam 25°51'56.03"S 25°31'50.50"E

Description

Setuma Dam is situated on the outskirts of Mafikeng – Mmabatho. Large parts of the dam are surrounded by low cost houses. There are a number of access points to the dam. There is also a water treatment works next to the dam.

Fishery background

In 2001, the RFP surveyed Setumo Dam. It was estimate that approximately 70 fishers fished on the dam. The fishers used hand lines, rods and gill nets. It needs to be noted that this has been the only place in South Africa where the RFP has recorded the use of home-made gill nets by fishers. This indicated that fishing was an important part of the livelihoods strategy.

The fishers fished all around dam, except by the dam wall were access was restricted by a fence. The fisher also ranged from young children to elderly men. Their catches included carp and tilapia. Most of the fishers sold their fish locally, but there was a Ghanaian businessman who would come regularly from Johannesburg and fill his car with fish for sale in Johannesburg.

There did not seem to be conflict between the fishers, however, they had all indicated that their catches had dropped over time and that they were concerned about it.

When this dam was visited in 2011, there were only about 30 fishers left and they fished only for local consumption. There was no indication that fish was being sold to an external person, but this could be that as the fish stocks declined it was no longer worthwhile for the Ghanaian business man to travel this distance to buy fewer fish.

Lotlamoreng Dam 25°52'35.06"S 25°36'13.08"E

Description

Lotlamoreng Dam is situated about 10 km from Mafikeng – Mmabatho. There are large human settlements around the dam, and the dam is used for a variety of purposes. It supplies drinking water to the town but it is also used by the members of the local community to wash their clothes and cars. The land around the dam is under the local tribal authority.

Fishery background

In 2001, The RFP surveyed Lotramoleng Dam. The biological survey showed that this dam had few fish, and thus was linked to the statements by members of the local community that a few years ago the dam was heavily fished by members of the local community.

During the initial survey, there were still a few fishermen (approximately five), and they also confirmed that in previous years there were far more fishermen. The fishermen who fished at the dam targeted for catfish, carp and tilapia and the fish that they caught was for their consumption and local sale.

When the dam was visited in 2011, there were still approximately five fishermen at the dam but it was not known if these were the same five. However, they did indicate that other fishers also regulary fish at this dam – possibly about 20 of them. This dam is not visited by recreational fishers.

Spitskop Dam 28°06'23.27"S 24°31'20.00"E

Description

This dam is situated in a rural area and there is no close by towns. The dam is on the border between Northern Cape and the NW Province. On the Northern Cape, its mostly private farm lands (and a small section belonging to a local community), while on the NW Province, mostly tribal land. There is a small village that in the NW side that is close to the dam. There are a number of entry points to the dam and once can drive around most sections of the dam.

Fishery background

This dam was visited in 2010. The RFP was contracted by the Northern Cape Department of Agriculture to assess the potential of developing inland fisheries in this dam (and other). At the dam, there is a well established recreational fishery. Recreational fishers from Northern Cape towns such as Hartswater and Christiana travel to this dam to fish. They have agreements (verbal) with the Department of Water Affairs to access their grounds to fish from there. They do not pay for this service.

The only subsistence fishers on the dam is from the NW side. It is estimated that approximately 20 – 30 fishers operate at this dam, using hand lines, rods and gill-nets. The gill-nets is contentious issue between the fishers from the local community and the recreational fishers and the Departments of Environment. Both the recreational fishers and the government officials confiscate the gill nets when they are spotted.

The Northern Cape Department of Environment is considering to develop a pilot fishery for a group of fishers from a local community who live about four km away. They have bought a farm (through government funding) that has access to the dam.

Vaalharts Weir 28°07'55.06"S 24°55'55.78"E

Description

This dam (weir) is on the edge of the town Vaalharts. The dam is an important part of the irrigation scheme that criss-crosses this area. The weir also plays an important role to manage floods. There are a number of entry points to the dam, and on one side of it borders a low cost housing area.

Fishery background

This dam was visited in 2010. The RFP was contracted by the Northern Cape Department of Agriculture to assess the potential of developing inland fisheries in this dam (and other). The dam is fished regularly by recreational fishers and subsistence fishers. Most of the subsistence fishers fish below the weir – as they have to pay to a certain section of the weir (where there is a park and the sides of the dam are low).

The subsistence fishers reported that there are 4 -5 fishers, but it is speculated that there are far more than the number indicated by the fishers. The fishers catch for food, but an important motivation for them is to sell their catches. There seems to be a demand for their fish (carp).
In fact, some of the recreational fishers that we interviewed also sold their catches. One of the recreational fishers, a well-established electrician, had a freezer in his electrical shop from which he sold carp that he caught. They sold their fish for approximately R 15 per kg.

When members of the local community were engaged with (in the presence of the Dept of Agriculture officials) they expressed that they could see a business opportunity in fishing as they knew of a white recreational fisher who regularly drove around the township selling carp from the back of his bakkie.

Granspan Pan

Description

Granspan Pan is situated in a rural area approximately 20 km from Vaalharts town. There are a number of villages around the dam and numerous entry points. It was not certain what the water is used for but the local cattle depend on it.

Fishery background

This body of water was visited in 2010. The RFP was contracted by the Northern Cape Department of Agriculture to assess the potential of developing inland fisheries in this dam (and other).

It was apparent that a number of years ago that this place was popular by recreational fishers (from Vaal Harts). A derelict structure that was once a large club house and other amenities was present. Presently recreational fishers from Vaal Harts do not visit this of water – it was not clear why the recreational fishers had left.

When this body of water was visited, two recreational fishers were met and they indicated that they fished here almost daily and that they sold most of their catch to the local community. With hand lines they targeted carp and would then "butterfly" the fish (cut the fish into two sections) so that it can dry effectively. One of the fishers had a bicycle which he used to go round the village to sell his fish.

Using a bicycle to sell fish a novel idea and it is possible that when developing inland fisheries in South Africa, economical methods to market and transport fish could be adopted.

Mpumalanga Province

(All of the dams in this province were visited in Feb – March 2012)

Mbambiso Dam 25°76'68.13"S; 31°61'28.16"E

Description

The dam is medium sized and surrounded by communal grazing lands, natural forest, with residential areas on the southern and eastern sides, around 1km from the waters' edge. The north-eastern and northern

banks have dirt roads running along them, and there is also access from the south. The western bank is covered with fairly dense forest. The sides of the dam are not steep.

Fishery Activity
Between 1996 and 2002 the dam was used for irrigating a government supported sugar cane farm which subsequently failed due to the presence of sandy soils. The water is now used only to support livestock.

No anglers can be confirmed, although a small craft was spotted in the shallows of the eastern part of the dam. It appeared to be being paddled by a man, although it was too far away to see any detail.

A man was interviewed at his household, about 1.5 km east of the dam. He reported that he knew of a man and two women who fish regularly. He did not specify which species they fished for or by which method, but said that they sold their catch to locals at a price of R8.00 to R10.00 per fish. The man appeared reluctant to provide us with information and directed us to the chief of the community on the southern side of the dam. Poppy Ramodibe (an agricultural scientist from the Inkomazi municipality) believed that the man was reluctant to speak to us as he may have been under the impression that fishing in the dam was illegal or strictly regulated, as it is in Driekoppies dam, 10 km north-west of Mbambiso dam.

Inyathi Dam 25°64'92.64"S; 31°69'59"E
Description
This small dam is situated 500 m east of Kamhlushwa residential area and is surrounded by a 3 metre tall concrete fence, which has been broken through in places. 10 metres from the concrete fence, on the eastern side, is a livestock fence. Both fences run through a part of the dam on the eastern side, allowing the livestock on the eastern side access to a small section of water. There is a sliding gate on north-western corner which allows access to the dam, which has gradual banks. The dam is currently used only to support livestock.

Fishery Activity
There were three groups of people fishing on the eastern side of the dam, with no-one on the other sides. A group of 4 men and 1 woman were fishing on the southern section of the eastern bank with home-made fishing rods. They were in the communal livestock area, east of the livestock fence. A group of 4 women and 1 child were fishing just north of them in the water with two 5 metre seine nets that did not have poles attached. They were attempting to corral the fish into opposing nets and into the shallows. A group of 3 men were fishing within the concrete enclosure with manufactured fishing rods, using earthworms as bait.

The women were fishing for the first time, and had been instructed by the local Chief not to use the net within the concrete enclosure, as he did not want them to muddy the water with their nets. They said that they were fishing in order to provide their households with food.

Shiyalongubo Dam 25°75'57.59" S; 31°26'48.15"E
Description
The dam is located 20km east of Barberton (as the crow flies), in the hills 3km north-west of the Swaziland border. The dam is at quite a high altitude and lies in a valley with moderate to steep sloping sides. There is access, from the dirt road which joins the R38, on the western bank of the dam from at least two points. The area around the dam is communal land and is used for grazing. The banks have been invaded by fairly old stands of eucalyptus and black wattle, probably due to the privately managed forests which lie 1 km to the south-west of the dam. There are two small, rural, communities living in close proximity to the dam, the one on the western side and the other on the north-eastern side. The latter is engaged with DAFF in a project whereby they are farming maize and beans. Being in a high rainfall area, these crops are rainfed.

The communities used to use the dam for drinking water, but now have water tanks on their properties which are filled up regularly by municipal water trucks. The communities still use the dam for washing clothes.

Fishery Activity
No fishing was found to take place at the dam

Doringhoek Farm Dams

Description

There are nine small dams located on the board of trustees' farm. The farm was given to the board of trustees as part of a restitution programme in 2004. The land on the farm is not used for anything, other than a small portion which has a guest lodge on it. The water from the dams is also not used for anything.

Fishery Activity

One of the trustees, Vellie Nkosi, has been in contact with DAFF and wishes to have the dam stocked with tilapia. He is not aware of the existence of any fishes in the dams and has not tried fishing there, but he would like to farm fish there and is also interested in recreational angling. If he was successful in beginning a fish farm on the dam, he would also be keen to market and distribute the fish which would be produced.

Casteel Dam 24°68'97.21"S, 31°02'45.32"E

Description

The dam is located 6 km north of Casteel, next to the R40. There are two communities living nearby, 500m to the north and south respectably. There is a dirt road providing access to the dam on the eastern bank, which is moderate to steep. The land surrounding the dam is used for communal grazing and is managed by the chief of the Morepuso people. The dam is small to medium in size. On the western side of the dam there is a drylands farming project which is supported by DAFF.

Fishery Activity

There were no people fishing when the dam was visited.

Interview: Informal, Simon Makwala (Agricultural Advisor, DAFF)

The water in the dam is very turbid. This is because of a brick factory that used to be located just north of the dam, which caused erosion and led to the dam's outlets being clogged. An EIA was conducted and the brick factory was subsequently removed. DAFF employees came to unblock the outlet but were scared away by a snake-like creature which is known to inhabit the dam. There also used to be hippos in the dam, but these were removed by the parks board for the public's safety.

The dam is a popular fishing destination, with as many as 90 people fishing there on the weekends, mostly in the early summer and not really in winter. Catfish, Tilapia, Segaga and Mohlela are caught in nets and are sold outside the municipality on the R40 for R7 to R15, depending on the size of the fish. Mohlela is a preferred fish. The people who enjoy fish are mostly Mozambican ex-patriots, while eating fish is not really in local peoples' culture. Recreational anglers do not make use of this dam.

Champagne Farm Dam 24°69'15.73"S, 31°08'81.97"E

Description

This dam is located on a 200ha government owned citrus farm, where it is used for irrigation. The dam is small to medium in size and has a small fence separating it from the dirt road which crosses it on a low-level bridge. There is access to the dam from the wall, on the northern side, which has a road running along it. There are hippo and crocodiles in the dam, which is fed by a canal from the Sand river.

Fishery Activity

There were no people fishing when the dam was visited.

The citrus farm used to be run by the homelands government, but was handed over to the community in 1994. The community have failed to keep the farm operational and it was taken over by DAFF in 2011.

There are very few people who fish in this dam, due to the presence of hippo. They fish with wooden rods and use earthworms for bait. As they cannot enter the water to use nets, they do not catch enough fish to sell and eat their catch.

Dingsleydale Farm Dams 24°69'50.43"S, 31°13'39.45"E

Description

There are 10 small dams in this area, all are fed by a canal system from the Sand River and all are used to irrigate the community owned farm, which is run by people from the Chochocho Village. The Chochocho village is located in the centre of the 950ha citrus farm, which has dams scattered throughout. The dams were built by the previous homeland government in 1968 and all can be accessed by a network of dirt roads. The coordinates provided are for the dam which was visited.

Fishery Activity

There were no people fishing at the dam when it was visited, and it is not known whether the dam is currently used for fishing.

Mr Makwala has never seen people fishing in the dams. In 2004, a group of locals was taken to Tompi Seleka Agricultural College and enrolled in a 6 month training course, where they were taught how to fish. Upon returning, DAFF stocked one of the dams with fish in the hope that they would reproduce and that a population could be sustained there. The following night the dam was drained and all the fish were taken.

Nyakha Dam 24°88'22.32"S, 31°07'63.74"E

Description

This is a large dam located 20km north of Hazyview, west of the R40. The R533 crosses over the western part of the dam. The dam is mostly surrounded by eucalyptus plantations, but the north-eastern part of the dam is 500m from Marijane, a fairly densely populated settlement. Apart from this settlement, the only other people found living near the dam occurred in a small isolated houses to the south of the dam. The south-east corner of the dam is fenced off and has a gate which was locked when it was visited. According to a local resident, this is where recreational anglers access the dam. There is a rough dirt road whereby the dam can be accessed along the southern bank, which is quite gradual. The dam is used to supply the local municipality with water.

Fishery Activity

No people were seen fishing at the dam when it was visited.

Informal Interview

A subsistence fisher interviewed indicated that they fish twice a week using hand lines, and home made rods. The fish that they catch, Bass and "Peru" (probably carp) is for their consumption and local sale. They catch about 30 – 40 fish a day. The fisher estimates that approximately 50 – 100 people from the local community also fish in the dam. Their primary reason to fish is for food

Witklip Dam 25°22'60.63"S, 30°89'57"E

Description

Witklip dam is located 20 km north-west of White River, next to the R537. It is medium sized. The dam is surrounded by pine and eucalyptus plantations and there is a small community living just west of the dam, next to a factory. There is access to the dam from both the eastern and western banks by dirt roads. The dam is managed by DWA.

Fishery Activity

No fishers were encountered at the dam.

The dam is popular amongst recreational fishers and there are also subsistence fishers, but not many. They use home-made rods and catch bass, barbel and carp. Mr. Twala has never seen them selling their catch.

De Gama Dam 25°14'87.81"S, 31°01'74.08"E

Description

De Gama Dam is located 25 km north of Hazyview on the R40. It is medium in size. The western side of the dam is surrounded by farmland and the eastern side by pine plantations. There is a peninsula in

the southern part of the dam belonging to Hulala Lakeside Lodge. The dam is managed by Whitewaters Irrigation Board. There is access to the dam from the lodge or, on the northern banks, by a network of dirt roads.

Fishery Activity
About a third of the guests at the lodge fish recreationally, for bass and tilapia. Most fish are caught after significant rainfall, and anglers with boats are generally more successful. The lodge has a licence which allows its guests to fish, although nobody ever checks it. They have seen locals fishing on the north-eastern banks of the dam, presumably subsistence fishers.

A keen subsistence fisherman was interviewed, who said he uses the fish that he catches to supplement the food which he buys with his income. He uses a bamboo pole and earthworms, catching bass, tilapia and barbel. He preferred fish was bass, as they have plenty of meat.

Klipkoppie Dam 25°20'83.58"S, 31°00'35.04"E
Description
Klipkoppie dam, a fairly large dam, is located about 15 km north of White River, between the R40 and the R537. The dam is completely surrounded by pine plantations. There is a section of land in the south-eastern corner which is owned by the Lowveld angling and Boating Association. The club has around 200 members who use the dam for water sports and fishing. The dam can be accessed at several points using the roads which serve to manage the plantations.

Fishing Activity
The recreational fishers fish for bass and tilapia and they have seen members from the local community who fish – however they indicated that when ever they approach the local fishers they run away.

Primkop Dam 25°38'03.23"S, 31°06'9.25"E
Description
Primkop dam is small to medium and elongated on the north-south axis. It is located 2 km west of Kruger Mpumalanga International Airport and about 10km north-east of Nelspruit. The dam is surrounded by farms and sparsely populated residential areas. The south-eastern bank of the dam is owned by the Lowveld Angling and Boating Association. This appears to be the only place where one can access the dam by road.

Fishing Activity
A recreational fisher was interviewed and he indicated that they target for catfish and carp. They eat the fish that they catch. They pay R 50 per person per day to fish on this dam.

Agricultural Research College Dam 25°42'47.88"S, 30°97'57.59"E
Description
This small dam, although the biggest on the ARC campus, is located 500m east of the R40 and 1km north of Riverside Mall in Nelspruit. The dam is surrounded by various agricultural projects. It is used to farm *O. mossambicus* in cages. The dam has been there for over 25 years and is fed by runoff.

Fishing Activity
The dam used to be used by a popular local recreational fishing spot, but after people were found tampering with the fish in cages and drinking whilst swimming in the dam the general public was banned. The only people who make use of it now are subsistence fishers who work at the ARC and DAFF staff members who fish at the dam recreationally with their families.

Vygeboom Dam 25°86'64.84"S, 30°62'16.43"E
Description
This dam is large and is located on the road between Barberton and Badplaas, 10 km north-east of the latter. The dam can currently only be accessed through privately owned recreational clubs, of which one needs to be a member to make use of. The land surrounding the dam is mostly used for recreation, but the

DWA owns two stretches of the bank: one in the south-western corner and another on the eastern side, where one can see longer grass and some herds of goats. The banks are gradually sloping. The water from the dam flows into Boschoek Dam and then into Nooitgedacht Dam. From here it is channelled to Eskom's coal power stations to be used for cooling.

Tow recreational fishermen were interviewed at their holiday homes on the western bank of the dam. They told us that they had recently put in a tender to develop a 7 ha plot of land adjacent to the Kijat Recreational Club as a public place of recreation. The DWA had already earmarked the land for tourism development and so Rassie designed his business plan based on their needs (***http://www.dwaf.gov.za/Documents/Other/RMP/Vygeboom/VygeboomDamSUPJan04.pdf***).

Their business plan includes building and maintaining facilities, caravan stands, chalets, houseboats (which they already have). They envision a project which will contribute significantly to local economic development, employing locals as picnic boat operators (allowing them gain skills in the form of skippers' licences and first aid courses). They would also like to use the area to conduct workshops to teach children from local schools how to swim and use paddleboats, which could potentially prevent further drowning in the dam. The NSRI will set up a station there which will provide further employment to the local community. This area would allow locals to access the water and would probably lead to increased fishing effort for subsistence fishers and recreational fishers alike.

Fishing Activity
At the time of the interviewed, the fisherman was busy hosting an angling competition in which 80 people were participating. The purpose of the tournament was to raise funds for the Kijat Recreational Club.

Nooitgedacht Dam 25°96'71.51"S, 30°06'73.48"E
Description
This large dam is located 10km north-west of Carolina. The dam is fully surrounded by the Nooitgedacht Dam Nature Reserve. The reserve covers 3420 ha, of which the dam takes up 756 ha. This is the only official reserve which consists of the Moist Sandy Highveld Grassland vegetation. Summer rainfall occurs here at an average rate of 900mm per year and temperatures have been known to fall to as low as -15°C in winter. The dam has large mouth bass, yellowfish, carp, sharptooth catfish and others. The Mpumalanga Tourism and Parks Agency manages the Dam and requests that anglers report all species of fishes caught, with an approximate weight, so that they can manage populations. The dam is managed according to the Mpumalanga Parks Board Act (No. 10 of 1998).

Fishing Activity
There are about 36 recreational fishers in this dam as well as subsistence fishers. The angler indicated that a few years ago the manager of the dam caught them with a gill net.

Limpopo Province

(All dams were visited in February – March 2012)

Chuniespoort Dam 24°20'33.67"S, 29°49'39.57"E
Description
This medium sized dam is located in Chuenespoort, which is 40 km south of Polokwane. Chuenespoort is a small town and so the dam is surrounded by people. On the northern bank of the dam lies Chuene Resort, which has conference facilities and chalets. The dam can also be accessed from the western bank by dirt roads. The dam wall is currently being strengthened.

Fishing Activity
Recreational anglers fish at the resort on the weekends and subsistence anglers fish on the western bank as they have free access from there. Carp, Yellowfish, Tilapia and Barbel are caught in the dam. A local person interviewed at the dam had not seen people fishing with nets in the dam before.

Nkumi Dam 24°29'86.83"S, 29°31'51.28"E

Description

This medium sized dam is located just east of Zebediela, which is 25km south-east of Mokopane. The dam has an elongated shape, running north to south. On the western bank livestock can be seen and the western bank belongs to the Tilapia Hengel Club, where access can be gained to the dam through an unlocked gate. The dam can also be accessed by dirt roads from the western banks. South west of the dam there is farmland, which is irrigated with water from the dam. Mathibela is the closest settlement to the dam, lying 3km to the south-east.

Fishing Activity

A recreational fisher interviewed stated that the dam would not contain any large fish as it does not have any trees close to the shoreline. Large fish enjoy the shelter found beneath trees like these and so they would not be found in this dam and it was for this reason that he was unwilling to fish here.

A subsistence fisher who was interviewed indicated that they fish for carp, tilapia and catfish. They fish mainly to consume. He indicated that there were many other fishers on the dam, especially over the weekend.

Ebenezer Dam 23°93'95.07"S, 29°97'75.70" E

Description

This medium to large sized dam is located 2km east of Haenertsburg. Being at a relatively high altitude, temperatures around the dam can be low at times. There are commercial plantations surrounding the dam, with patches of indigenous forest in between. The southern bank has two recreational clubs, Ebenezer Boat Club and Mountain Yacht Club. The dam wall is located on the eastern side and is controlled by Lepelle Northern Social Club, which also has a number of chalets on the north-eastern bank. Lepelle Northern Social Club treats also has a water-bottling plant, which is supplied by the dam. The dam can also be accessed from the northern shore, where there are a number of large holiday homes, several which are in the process of being constructed. This area is known as Clearwaters Cove.

Fishing Activity

The Yacht Club caretaker informed us that there are recreational fishers who access the dam through the Yacht Club and subsistence fishers who access the dam next to the boat club. He informed the researchers that he eats fish regularly, as his religion (Zionism) requires it. His religion, however, also forbids him from eating catfish.

Metz Dam 2425'76.27"S, 30°45'04.54"E

Description

This small to medium sized dam is located in Metz, which is a fairly densely populated corridor about 70km south-east of Tzaneen. The south-western and south-eastern banks belong to the Metz Community's Tribal Authority and livestock are grazed here. There is a hospital on the northern side of the dam which draws water from it. Access can be gained from the wall on the north-eastern side, which has a narrow road running along it.

Fishing Activity

The subsistence fisher who was interviewed indicated that over weekends there were many fishers – but he could not provide a number. The main fish targeted is bass and tilapia. The fish is for local consumption. The method to catch the fish is with rods and he uses earthworms for bait.

Nsami Dam 23°25'11.25"S, 30°76'25.77"E

Description

This medium sized dam is located 8 km north-east of Giyani. There are two neighbourhoods nearby, Makhosa on the western bank and Thomo 2 km west of the dam. The eastern banks of the dam are very gradual and have short vegetation, allowing easy access. The land surrounding the dam is used as a communal grazing area. Water from the dam is treated and used for the Greater Giyani municipal water supply.

Fishing Activity
The fisher interviewed on this dad targets tilapia and carp, by use of a rod. There are more fishers who fish on this dam, but he was not sure as to exactly how many. The fish caught is for subsistence.

Albasini Dam 23°10'66.55"S, 30°11'10.36"E
Description
This dam is located 8 km north-east of Edim, which is the nearest settlement. Kkwazi Lodge is situated on the southern bank of the dam, and the north-western bank, as well as the dam wall on the western side, is controlled by DWA. There also appears to be access from the northern and southern shores on the eastern section of the dam (the dam is elongated on the east-west axis). The area north of the dam is used for agriculture. The water from the dam supplies the Makado area.

Fishing Activity
A security guard informed us that there are no settlements near the dam, just wild animals. She said that DWA provided facilities for events such as weddings and picnics. She told us that we were not to take pictures of the dam wall.

There are about 5 fishermen every average weekday and about 40 fishermen every average weekend day who visit the dam. Recreational anglers mostly come on weekends and use boats a lot.

A subsistence fisher on this dam indicated that there were many other fishers on this dam and they fished mainly for bass and tilapia. The fished using bamboo poles and they ate most of their catches.

Molepo Dam 24°01'46.37"S, 29°77'45.80"E
Description
This medium sized dam is located 40 km south-east of Polokwane. There are two settlements surrounding the dam, Ga-Ramphere to the north-west and Ga-Mmamatsha to the north-east. The area east of the dam looks as if it was once used for farming, but there doesn't appear to be much happening here anymore. There is a construction company performing maintenance on the dam wall, which is on the southern side. The area seems very dry, and livestock graze around the sides of the dam. There used to be Hippos in the dam but the parks board removed them as they were attacking cattle. The western bank has good access.

Fishing Activity
One man was encountered fishing on the dam wall and there appeared to be some people fishing with nets from the south-eastern bank, north east of the dam wall. It was too far to be sure though, and access past the dam wall was forbidden.

The subsistence fisher interviewed fished about 2 days a week, and targeted catfish and tilapia. During the week there were about 2 – 3 fishers, however over the weekend this number can increase to approximately 20. The motivation for fishing was for food.

Turfloop Dam 23°88'50.14"S, 29°77'33.78"E
Description
This small to medium sized dam is located 30km east of Polokwane, in Turfloop Nature Reserve, which is next to the University of Limpopo. The Department of Environmental Affairs has offices within the reserve and DAFF has concrete reservoirs just below the dam wall on the western side, where fish are bred for their aquaculture projects. Turfloop Safaris operates within the reserve, and this is a project of Limpopo Wildlife Resorts.

Fishery Activity
The dam can be accessed from the northern bank, where recreational anglers launch their boats.

The dam is in a protected area and so fishing with nets is prohibited and people do not even try. Typically, 5 – 10 recreational anglers use the dam on weekend days and 1 -2 recreational anglers on weekdays.

Subsistence anglers are very rarely seen (perhaps because it costs R20 to fish at the dam), once a month at most. The dam has Tilapia, Barbel and Carp.

Sheshego Dam 23°84'09.40"S, 29°37'02.32"E

Description

This medium sized dam is located 6 km north-east of central Polokwane, in a very densely populated, large neighbourhood known as Sheshego. The land immediately around the dam is communal and there are some livestock there. Sheshogo park, on the south-eastern shore, pumps water out of the dam for watering their lawns. There are several dirt roads providing access to the dam, from the southern bank and from the northern bank.

Fishery Activity

The fisher interviewed indicated that they targeted mainly for tilapia and catfish and carp (though tilapia was the preferred fish). The fishers used rods, and fished using bait balls (for carp). On an average day there would be about 20 fishers per day and in the summer months there could be as many as 40 fishers. Most of the fishers ate their catches.

Nzhelela Dam 22°74'21.48"S, 30°09'61,88"E

Description

Nzhelela Dam is medium to large in size and is located roughly 70 km south-east of Musina. There are three rural settlements nearby: Makushu (3km to the east), Musekwa (3km to the south) and Mufongodi (1.5km to the south-east). The area where the dam is situated is very dry. The dam is managed by the DWA, who have their offices to the north, off the R525 and who have a road leading to the wall, which is also on the northern side. It appears as though there may be access from the Mufongodi side of the dam. The southern part of the dam falls within the Nzhelela Nature Reserve.

Fishery Activity

Fishing is allowed from this reserve and there is no charge, although they only allow 20 people in for fishing per day.

The dam was built circa 1940 for use as a reservoir to supply irrigation networks in the area. It has recently been proposed that the dam should feed the municipal water supply as well. Mr. Manabela has been employed at the reserve since 1987 and has noticed that people seem to catch relatively few fish in recent times. Both recreational and subsistence anglers make use of the dam. Recreational anglers mainly come during the holidays, when the reserve will often receive their limit (and sometimes more) of 20 people per day. Subsistence fishers are more regular in their use of the dam, catching fish to sell in the local community for around R5 per fish. The local community enjoys fish and many will even choose fish over meat. People catch Tilapia, Barbel, Carp and Eel here. A dam administration official interviewed stated that he had noticed that people fishing with nets are more likely to catch larger fish than the anglers. People were caught using nets in the reserve as recently as January 2012. The usual procedure is to take their nets away and issue a fine, given that the local jails are overcrowded.

There were two groups of subsistence anglers fishing at the dam on the day that it was visited. Only one group was located and they had managed to get to the other side of a river and so were not in reach.

Alicedale Estate Dams 22°62'35.78"S, 30°14'34.80"E

Description

These two dams, one small and one very small, are located 35 km south-east of Musina, just north of the R525, on a private estate owned by Peter and Lynette Nicholson. They are used to irrigate the farm. Access to the smaller dam can be gained easily, as it is just off the R525. The larger dam can only be accessed through the main gate to the farm, which lies to the west. A farm labourer was at the pumphouse for the smaller dam, just south of it, on the day it was visited.

Fishery Activity

An estate labourer informed the researchers that farm labourers are only allowed fishing on the smaller dam. And only on Sundays, which is unfortunate for those who go to church. He says that his boss reserves the right to fish the bigger dam for himself. He also added that his boss sometimes catches fish from the smaller dam and takes them to stock the larger dam.

Fundudzi Lake 22°85'05.51"S, 30°31'22.66"E

Description

This lake is situated in a very remote, mountainous area about 70km south-east of Musina (as the crow flies). The lake is difficult to access, and a 4x4 vehicle is advisable if one wishes to attempt it. The lake is sign-posted from the R523 from somewhere in the Tshirenzheni area. From google earth it also appears as though there may be access from somewhere further west, in through the Holy Forest (Thathe Vondo). There is an isolated community living 6km south-west of the lake called Tshithuthuni, where one angler was interviewed. The lake could not be accessed due to a river which flowed over the already hazardous road. Some livestock were seen nearby the lake and the river flowing over the road had been modified using Gabion Groynes, which seemed strange given how remote the river is.

Fishery Activity

The angler who was interviewed informed us that pumps are not allowed in the lake, but did not elaborate on this. He also mentioned that someone had once tried to introduce fish into the lake, but that the fish had all died within three days because the lake was too warm for them.